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LECTURES

ON THE

DISEASES

OF THE

URINARY ORGANS.

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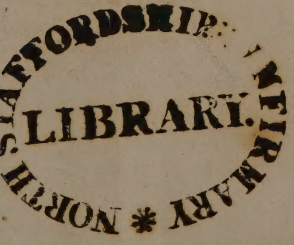
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SERJEANT SURGEON TO THE KING,
AND SURGEON TO ST. GEORGE'S HOSPITAL.

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ADVERTISEMENT.

My Lectures on the Diseases of the Urinary Organs have been already published in one of the Medical Journals. They are now again offered to the Public with much additional matter, and (as I trust) altogether in a more perfect shape.

My opportunities of studying this important class of Diseases, during the last twenty years, have been very considerable; and I have endeavoured to record what I have seen with accuracy and fidelity, making it my especial object to explain and illustrate those circumstances, which were to myself a source of doubt and difficulty in the earlier part of my practice. It is on those grounds that I am led to hope that the present

volume may prove not unacceptable to the junior members of our profession.

If it should fall into the hands of any more experienced Surgeons, I request of them to bear in mind that these were Lectures addressed to Students who required to be informed on all points, and who would have profited but little by my instructions if I had confined myself to the exposition of new views, and the detail of original observations.

ON

THE DISEASES

OF THE

URINARY ORGANS.

LECTURE I.

In this and the following Lectures it is my intention to communicate to you the results of my experience as to the diseases of the urinary organs, and the treatment which is required for their relief.

Among all the important subjects which demand the attention of the surgeon, there is none more important than this. These diseases are always a source of great anxiety; in many instances, of pain and misery; to the patient; and, for the most part, if allowed to run their natural course, they terminate in his destruction. At the same time there are no cases in which we are, on the whole, enabled to render to those who suffer more essential service; often, by removing the disease altogether, at other times by relieving the more distressing and dangerous symptoms.

I shall call your attention, first, to the diseases

of the urethra; afterwards, to those of the bladder and prostate gland. My concluding observations will relate to urinary calculi.

OF DISEASES OF THE MALE URETHRA.

The urethra in the male being long and narrow, complicated in its structure and its functions, you will not be surprised that it should be liable to more numerous, as well as to more serious, diseases than the short, wide, and simple urethra of the female. What I know of the diseases of the latter may be comprised in a few words, while those of the former will require a more minute investigation.

Strictures of the Male Urethra.

A mechanical obstruction to the flow of urine through the male urethra may arise in various ways. There may be an enlargement of the prostate gland, by which one extremity of the urethra is surrounded; an abscess in the perineum; or one of the mucous follicles may be inflamed, and converted into a solid tumour; and any one of these, as well as some other, causes may operate so as to produce the effect which I have mentioned.

The most common cause of difficult micturition is, however, a contraction or stricture of

the urethra itself; and this disease requires our first consideration.

It is usual to regard strictures of the male urethra as being spasmodic or permanent; and I cannot but believe that the distinction is well founded.

Such a case as I am about to describe is not uncommon. A man, who is otherwise healthy, voids his urine, one day, in a full stream. On the following day, perhaps, he is exposed to cold and damp; or he dines out, and forgets, amid the company of his friends, the quantity of champagne, or punch, or other liquor containing a combination of alcohol with a vegetable acid, which he drinks. On the next morning, he finds himself unable to void his urine. If you send him to bed, apply warmth, and give him Dover's powder, it is not improbable that in the course of a few hours the urine begins to flow. After the lapse of a few more hours you give him a draught of infusion of senna and sulphate of magnesia, and when this has acted on the bowels he makes water in a full stream.

You are called to another patient under the same circumstances, except that he is suffering more severely. You feel the distended bladder occupying the lower part of the abdomen, and forming a distinct tumour, extending nearly to the navel. The case is urgent, requiring active treatment and immediate relief. On the introduction of a bougie you discover an obstruction in what is termed the membranous part of the

urethra. Having no small bougie at hand, you press one of a middle, or full size, against the obstruction for a few minutes; and then withdraw it at the moment when there is a sudden and violent impulse to make water. Although the bougie has not penetrated into the contracted part of the urethra, so as to dilate it mechanically, on its being withdrawn, it often happens that the patient begins to make water in a considerable stream. In other instances the same effect is produced by touching the obstruction for a few seconds with the nitrate of silver. The urine flows freely, and the patient's sufferings are at an end.

Now, in these cases, the difficulty of micturition comes on suddenly, and subsides suddenly; and we must presume that the cause of it is a temporary, and not a permanent, change in the condition of the urethra.

Under such circumstances, we find that the obstruction is always at one part; that is, at what is called (not very properly) the membranous portion of the urethra. And here, be it remembered, that the canal is surrounded by a muscle of no inconsiderable size, connected by a small double tendon to the arch of the pubes. A particular description of this muscle has been given by the late Mr. Wilson, in the first volume of the Medico-Chirurgical Transactions; and it seems to afford a reasonable explanation of the phenomena which I have just described. It is plain that a powerful spasmodic action of these

muscular fibres must obstruct the passage of the urine; and, taking all the circumstances into consideration, we seem justified in applying the term spasmodic to this species of stricture.

In another and much more common series of cases the patient's history is nearly as follows: — He voids his urine in a diminished stream, and you find, on enquiry, that the diminution has been going on for months, or even for years. By degrees the stream becomes still further diminished, so that it is no larger than a thread; and at last there is no stream at all, the urine being voided only in drops, and not without much difficulty and straining. Should the patient die, and an opportunity be thus afforded of examining the state of the diseased parts, you find the urethra contracted in one portion of its canal, its membrane thickened at the point of contraction, and converted into a substance of the consistence, though without the fibrous structure, of ligament. These cases are manifestly essentially different from the last. The contraction, if not relieved by art, goes on uniformly increasing. We say that there is a permanent stricture.

The distinction between spasmodic and permanent strictures cannot be regarded as theoretical. Nevertheless we find, in practice, that the two kinds are very much blended with each other. A stricture may be originally spasmodic. The frequent recurrence of the spasm, and the pressure of the contents of the bladder against it, may well be supposed to excite a slow inflam-

mation, sufficient to cause the membrane of the urethra to become thickened. This re-acts on the muscular fibres so as to increase their disposition to spasm; and thus the two go on together, and the spasmodic is gradually converted into a permanent stricture. On the other hand, an old permanent stricture is generally more or less liable to be affected spasmodically. The urine is always voided in a diminished stream; but one day the size of the stream is such, that the patient experiences little or no actual inconvenience. Perhaps, on the following day, in consequence of exposure to damp and cold, or some irregularity as to diet, he is laid up with a complete strangury.

The ordinary situation of a permanent stricture is at the anterior extremity of the membranous part of the urethra, just behind the bulb of the *corpus spongiosum*. If the disease be recent, it occupies but a small portion of the canal. If it be of long standing, it becomes very extensive; the contraction being greatest in the middle, and becoming gradually less towards each extremity. Sometimes the original stricture is anterior to the bulb between it and the external orifice of the urethra. These cases, however, are comparatively rare. It is worthy of remark that a stricture in this situation (that is, in the anterior portion of the urethra,) is seldom complicated with spasm, probably because there are no muscular fibres immediately surrounding the canal at this part. The fibres of the *acceleratores urinæ* muscles are external to the *corpus spongiosum*, and not being

in contact with the urethra are, probably, less liable to be affected spasmodically by causes which act upon the latter.

In some very old cases we find a permanent stricture behind the bulb, and another anterior to it; and in other cases, where the disease has been of still longer duration, we find the whole urethra more or less contracted, and the membrane of it thickened; the contraction being greater in some parts, and less in others. The urethra becomes diseased in old cases behind the stricture, in various ways. Small irregular prominences, or tubercles, are sometimes found on its inner surface, which probably originate in minute depositions of coagulated lymph, which subsequently become organized. The orifices of the mucous glands, and those of the prostatic ducts, are often preternaturally dilated; and, indeed, the whole canal of the urethra, behind the stricture, is widened in consequence of the bladder forcibly impelling the urine into it, there being at the same time an insufficient outlet for its escape.

This dilatation is most remarkable when the stricture is in the anterior part of the canal. I attended a gentleman, who for many years had laboured under a stricture, situated about three inches from the external meatus. The urethra behind the obstruction was so dilated, that whenever he made water, a tumour as large as a small orange, and affording a distinct fluctuation, was to be felt in the perineum; it might

be compared to a second bladder. Once when he sent for me, and I found him labouring under a complete retention of urine, I punctured the tumour in the perineum with a lancet, and immediately the urine gushed out in a full stream. From that time the water was passed regularly through the artificial opening: he had no more retention, and thus I was enabled to direct my whole attention to the removal of the stricture. By quiet, and the use of the bougie, the urethra was once more enlarged to its natural size. The perineal opening healed, and the patient recovered much more speedily than if the urine had been allowed in the first instance to pass through the natural channel.

In other cases of long standing, I have found an oblong, irregular, indurated, gristly mass at the lower portion of the penis, just where it is covered by the scrotum. For example: — A gentleman, who had been many years in a hot climate, returned to England labouring under a stricture, and voiding his urine with great difficulty. A hard oblong tumour could be felt in the neighbourhood of the stricture, though somewhat anterior to it, at the upper part of the scrotum. I dilated the stricture, so as to enable the patient to introduce a bougie for himself; but still the tumour remained unaltered. He died a year afterwards of an accidental attack of disease in the brain; and I found, on dissection, the tumour apparently caused by a deposition of lymph into the cells of the *corpus spongiosum*. Immediately behind the

stricture there was an orifice leading into a considerable sinus, extending from the urethra into the gristly substance of the tumour. The direction of the sinus was from behind, forwards, so that it was evident it could not have arisen from an improper use of the bougie. I conclude, that the sinus was produced by the forcible and repeated pressure of the urine against the urethra behind the stricture. The same cause which produced the sinus was, of course, sufficient to produce the gristly induration round it.

We cannot always trace the origin of stricture. In those strictures which we look upon as spasmodic the cause is generally something which acts as a source of local irritation. The urine may be unnaturally stimulating from containing an excess of lithic acid. Hence, as I have already explained, the spasm comes on often after indulging in spirituous or fermented liquors, especially those which contain a combination of alcohol with acid, such as champagne or punch. We may presume that the absorption from a blister acts in a similar manner; that is, by increasing the stimulating effects of the urine. Gravel or stone in the bladder will produce the same effects. Diseases of the kidney, and of the rectum, as hæmorrhoids or carcinoma, act sympathetically on the urethra, and not unfrequently give rise to spasmodic stricture.

Permanent stricture frequently follows an obstinate gonorrhœa. Astringent injections have

been sometimes considered to be causes of this disease; but I certainly believe, that this practice has been more reprehended than it deserves. It is the abuse, and not the use of injections, which is to be deprecated. I have no hesitation in saying, that there is greater danger as to producing stricture from a very long continued gonorrhœa or gleet, than from the prudent use of a mild astringent injection. A permanent stricture may arise from an ulcer or abscess of the urethra; but as this differs in some essential particulars from ordinary strictures, it will require a separate consideration.

Stricture is a disease of early manhood, rarely occurring before the age of puberty, or in advanced age. If you are consulted by two patients, on account of difficulty of making water, the one a young, the other an old man, the chances are, that the first suffers from stricture. If the old man states that the difficulty of which he complains has existed for a series of years, you may conclude that he also labours under stricture. If, on the other hand, you can trace it back to a few days or weeks only, or even if he says that it has been coming on for the last year or two, then it is most probable that the impediment to the flow of urine arises from enlargement of the prostate gland.

I shall next enumerate the symptoms of stricture. Where the disease is purely spasmodic, the first symptom which attracts the patient's attention is a difficulty in making water, which

speedily terminates in complete retention. In permanent strictures, which, I repeat, are the most common, the stream of urine becomes diminished long before any absolute difficulty exists.

The shape of the stream of urine is altered in cases of permanent stricture; being flattened, or spiral, or split into two. Now, as the shape of the stream of urine depends on that of the canal through which it flows, it may be affected by many causes besides stricture, a cicatrix, for example, or an enlarged mucous follicle. From the alteration in the form of the stream of urine, therefore, we can only infer an irregularity in the canal through which it flows; but other circumstances must be considered before we pronounce that irregularity to be connected with actual stricture.

In the early stage of stricture there is frequently a gleet, that is, a discharge of mucous or muco-purulent fluid from the urethra; and this is attended with a sensation of itching, or even with a slight degree of heat and pain in making water. It is worthy of remark, that whatever may be the seat of stricture, this fluid seems to be secreted by the anterior part of the urethra; that is, the first two or three inches.

As the disease proceeds, the bladder becomes irritable, and this forces the patient to rise often in the night to pass his water. The stream becomes diminished more and more, till at last some exposure to cold, or imprudence as to diet,

brings on complete retention of urine in the bladder.

The symptoms of retention are formidable enough, and they generally attack the patient suddenly. He is, perhaps, sitting with his friends after dinner, and feels an inclination to make water. In attempting to do so, however, he is foiled. A second and a third attempt is made at different intervals, and all without success. Now, however, the case assumes a more serious aspect. There is an indescribable uneasiness felt in the region of the bladder; the efforts to void the urine are no longer voluntary, the patient is forced to strain, and the whole of the abdominal muscles are seen in convulsive action, instinctively endeavouring to unload the bladder of its contents. This viscus may be felt hard and large above the pubes. The heart now begins to sympathise with the local irritation; the pulse is hard and strong; the face flushed, the skin hot, and the tongue covered with white fur. Perhaps the violent efforts of the patient may force out a few drops of urine, and thus afford him some relief; but the kidneys go on secreting, and the relief is only temporary. In the great majority of cases the spasm is spontaneously or artificially relieved; but there have been, nevertheless, numerous examples of the contrary, in which the retention has even terminated in death. The bladder itself may be ruptured at the fundus, the urine escaping into the surrounding cellular membrane, and into the

abdomen. Such an event occurred in a patient in St. George's Hospital twenty-five years ago. The patient exclaimed, after a violent paroxysm of straining, that the bladder had burst into the belly. He died, and on examining the body, it was ascertained that the poor fellow's words were true. This case, and another similar one, have been published by Sir Everard Home. Fortunately, such cases are rare.

In most instances the rupture is not of the bladder, but of the urethra just behind the stricture. Conceive a distended bladder, and the spasmodic action of the abdominal muscles of a powerful man squeezing it, and you will readily understand with what impetus the urine must be forced through the lacerated urethra into the surrounding cellular membrane. In fact, the scrotum, the penis, the perineum, nay, sometimes the groins, and the lower part of the belly, are enormously swollen with the acrid urine. The first effects of this injury are to put an end to the patient's sufferings. There is no more straining or spasm, and the stricture itself becomes relaxed, so as to allow the urine to flow through the natural passage. With this interval of ease from misery, a new and often fatal train of symptoms set in. The urine, under any circumstances, would irritate parts unaccustomed to its contact; but the urine, in a case of retention, has been long in the bladder, and is loaded with saline matter, so that its stimulating properties are much increased. Wherever this acrid

fluid penetrates, it first inflames, and then kills the part. The patient is seized with a fit of severe shivering, the skin of the scrotum, and penis, and other parts, then becomes red and inflamed. If you make incisions into it, you will find black offensive sloughs underneath. If the incision be not made at all, or be not sufficiently extensive, the skin itself becomes speckled with dark spots; these increase in size, and large patches of it are converted into sloughs. Sometimes a black spot may be seen on the glans penis; it is a most fatal sign, for I never knew one to recover in whom it appeared. It indicates that the urine has been effused into the cells of the *corpus spongiosum*. As this process of sloughing goes on, the constitution becomes affected, just as if the mortification had been induced by any other cause. At first the pulse is full, and the skin hot, but the depressing effects are soon manifest. The heart beats feebly and frequently, then the pulse becomes irregular, and afterwards intermitting. The skin turns cold and clammy, the patient is troubled with an incessant hiccough, which nothing relieves for more than a very few minutes. He mutters in low delirium, then falls into a stupor, and dies.

The time during which a retention of urine may continue before rupture of the urethra takes place is much longer than you would expect. Such a catastrophe as I have endeavoured to describe rarely occurs before the third or fourth day. It may occur sooner, but often the period

of it is even later than this. The retention may continue for a week, with occasional short intermissions, during which, urine comes away in small quantities, and then the urethra gives way, and the urine is extravasated. Each case will be variously modified, and thus the result may be variously influenced. In one, the secretion of urine may be rapid and abundant, or the bladder may not be so dilatable as in other cases. It is evident, *cæteris paribus*, that the laceration will in these happen more readily and sooner than in cases where the secretion of urine is slow and scanty, or where the bladder admits of great distention.

Of those individuals who labour under stricture of the urethra, some are more, and others less liable to retention of urine. Much depends probably on the patient's constitution, but much also on his mode of life; and those who are exposed to vicissitudes of temperature, or who indulge in the use of spirituous or fermented liquors, are troubled with retention of urine more frequently than those whose mode of life is different. One person may suffer from an attack of this kind not oftener than once in six months, while another may be affected in the same way every week, or fortnight. In the intervals, the stream of urine becomes narrower and narrower, and at last it flows only in drops. In some cases it dribbles away constantly and involuntarily, and the bed and clothes are absolutely sopped in urine, making the unhappy patient disgusting to

himself and to his friends. This involuntary dribbling does not, in general, indicate a contracted state of the bladder, as you would suppose, but just the reverse. The bladder is, in fact, loaded with urine; and, when it does not easily admit of further distention, the urine overflows, and all beyond a certain quantity is discharged involuntarily. The exceptions to this rule are very rare, and it applies not only to the involuntary flow of urine in cases of stricture, but also to that which takes place under other circumstances.

In the advanced stage of the disease, there is sometimes a natural effort made, I will not say for the patient's cure, but for his relief. I am much mistaken if a stricture is not sometimes destroyed, at least in part, by ulceration. For example: I attended a gentleman, who had laboured under stricture of the urethra for a great number of years. He voided his urine with the greatest difficulty: the stricture was rigid and unyielding; but I succeeded in the introduction of a catgut bougie, which enabled him to make water in a small stream. Under these circumstances, he was seized with pain in the act of making water, which lasted for some minutes afterwards. The pain became more severe: it was referred to the situation of the stricture in the posterior part of the urethra; and the patient described it as intolerable. He said he could compare it to nothing but the sensations which he supposed would be produced if melted lead

were poured into the urethra. Every half hour he had a desire to make water, and his screams and groans could be heard, not only over the whole house, but even in the street. In the course of a few days these symptoms began gradually to abate, and now it was discovered that the urine flowed in a much larger stream. When the attack had completely subsided, the condition of the patient was much improved, for he made water more freely than he had done for many years. I know not how the symptoms which occurred in this case, and the improvement which followed, can be accounted for, except on the supposition of the stricture having been in a state of ulceration.

Such a case is rare; but what I am going to describe is common enough. The patient complains of more than usual difficulty in making water. Perhaps he has a shivering. A hard tumour, with some degree of œdematous swelling round it, presents itself in the perineum, or on the adjoining part of the nates. The skin over it becomes inflamed, and the fluctuation of fluid is perceptible under the inflamed skin. An abscess bursts, or you open it with a lancet, and a considerable quantity of pus is discharged. Then the œdematous part of the swelling begins to subside, pus continues to flow through the orifice of the abscess; and, after a longer or shorter time, it is observed that urine flows through it also. The discharge of pus diminishes, but the urine flows in larger quantities; and whenever

the patient makes water, part escapes through the natural channel, and part through the orifice of the abscess. The abscess has evidently a communication with the urethra behind the stricture. If you have an opportunity of dissecting the diseased parts, while the abscess is recent, you find it to open into the urethra by a ragged irregular orifice. If you examine the parts at a later period, the orifice, by which the abscess and the urethra communicate, is found to be smooth, regular, and rounded at the margin. Sometimes, instead of one, there are two or three such orifices. The urine continuing to flow through the abscess, the sides of it become hard and callous, and a callous tubercle is formed where it opens on the external skin. We now call it a fistula in perineo. Such a fistula, however, may open elsewhere; on the scrotum, or the groin, or even on the penis near the scrotum. From the time that the fistula is established, the difficulty in making water is much diminished. There are no more attacks of retention of urine; since, although the stricture is closed, there is still a passage by which the bladder may discharge its contents. The formation of the abscess in the perineum is always attended with some degree of fever. But sometimes the febrile symptoms are very urgent: the skin is hot, the pulse small and frequent, the tongue brown, and covered with a black crust. If the abscess be not opened, the patient is likely to perish with these typhoid symptoms before there is time for

it to burst spontaneously. If you open it, a dark-coloured offensive putrid pus is discharged. The bad qualities of the pus, in these cases, are manifestly owing to an admixture of urine. An immediate improvement follows the opening of the abscess: the pulse becomes less frequent, the skin less hot, the tongue clean and moist, and the patient, who appeared on the verge of death, is restored to life, and comparatively to health.

I have seen a few cases in which there was a fistulous communication between the rectum and urethra behind the stricture. If such an opening be of large size, it is a source of great distress, as fæculent matter occasionally insinuates itself into the urethra. If it be small, the absolute inconvenience is trifling, and the patient is rendered sensible of its existence only in consequence of a small quantity of air occasionally escaping by the urethra.

LECTURE II.

Strictures of the Male Urethra continued.

If you consider the relations which the urethra bears to the bladder and prostate gland, you will not wonder that these organs should suffer in old and inveterate cases of stricture.

A chronic enlargement of the prostate gland is one of the most frequent changes to which the body is liable in old age; and it may take place in those who labour under stricture of the urethra as well as in other persons. There is, however, more than this merely accidental combination of the two diseases with each other; and those who have long been tormented with stricture, are more liable to disease of the prostate, and are liable to it at an earlier period of life, than those in whom the urethra is free from obstruction. In a great number of instances, where the patient is somewhat advanced in years, after you have dilated the stricture, you find that the relief is incomplete, and remedies beyond those which the stricture itself demands, are necessary to remove or palliate the symptoms produced by the disease of the prostate. Abscess in the substance of that gland, or its immediate neighbour-

hood, is not an uncommon occurrence in old cases of stricture; and it generally bursts into the urethra, or at the neck of the bladder. In the former instance, the first bursting of the abscess is indicated by a profuse purulent discharge from the urethra, unmixed with urine; and by a constant, though more moderate, discharge afterwards. In the latter case, a deposit of pus is observed in the urine. It is not, my intention to enter at present into the history of the additional symptoms which arise from this complication of disease in the prostate in old cases of stricture; since they do not materially differ from what we observe in other cases, where the prostate is alone affected. For what I have to say on this head, I must refer you to a future Lecture. There are, however, two observations which may, perhaps, be introduced now better than hereafter. The first is, that where a chronic enlargement of the prostate supervenes on a permanent stricture, the latter becomes less liable to spasm, is more easily dilated, and is altogether more tractable than it was before. The second observation is, that, although the combination of stricture and disease in the prostate is common enough, still it is not so common as it is supposed to be by some surgeons. The urethra, in cases of disease of the prostate, is often unusually irritable, and spasm is more readily induced in it, or in the muscular fibres surrounding it, than where the prostate is healthy. An old man, who has a frequent desire to void his urine, and voids

it slowly and with difficulty, applies to a surgeon, whose hand is light and accustomed to the use of the catheter. The catheter is passed readily, or at any rate it meets with no obstruction until it reaches the neck of the bladder, and the case is set down as one of disease in the prostate, which it really is. Another old man, under precisely similar circumstances, applies to a surgeon, who uses the catheter rudely and incautiously. The urethra resents this rough usage; spasm is induced, and the point of the catheter cannot be made to pass further than the membranous part of the urethra. The case is then supposed to be one of stricture, and is treated as such: I need not tell you to how little purpose.

I have already mentioned, that the bladder is rendered irritable in many cases of stricture. In consequence of this it is never properly distended; and it becomes small and contracted. If the stricture be dilated, the morbid irritability of the bladder is relieved, and the latter soon regains its natural capacity. In many cases, where the disease is of long standing, the inner membrane of the bladder becomes affected with chronic inflammation. It secretes a ropy adhesive mucus, which sticks to the bottom of the chamber-pot. Sometimes this mucus is formed in such abundance as to obstruct the canal of the urethra, closing the stricture, and adding very much to the difficulty of making water. In such cases, if you examine the body after death, you find the mucous membrane of a dark red

colour, in consequence of the turgid state of the blood-vessels; and things may continue in this state, sometimes better, and sometimes worse, for months, and even for years.

I have met with several cases of stricture, in which the internal membrane of the bladder was found, after death, not only inflamed, but encrusted, over a large part of its surface, with coagulated lymph. Such an effusion of lymph is the result of acute inflammation, differing in its character from the chronic inflammation, which produces the secretion of adhesive mucus; and it is observed chiefly (if not exclusively) where the patient has died after having been harassed by repeated attacks of retention of urine.

There are other cases in which, instead of being irritable and contracted, the bladder is rendered more capacious than natural, and the patient never empties it completely. Here, when you have dilated the stricture, the symptoms are only partially relieved; and on introducing the catheter, you find a large quantity of urine to have been retained in the bladder.

In most cases of stricture, the muscular coat of the bladder is thicker and stronger than natural. This circumstance is easily explained: the bladder has been called on to make unusual exertions; and it is a law of the animal economy, that muscles, which are unusually exercised, should become increased in bulk.

In some instances, the mucous membrane of the bladder is protruded through some of the in-

terstices of the muscular fibres, forming numerous small cysts communicating with the cavity of the bladder. These cysts appear to be produced in the following manner:—When the patient strains in voiding his urine, the mucous membrane is pressed on by the urine from within, while it is compressed externally by the muscular fibres; and the consequence is, that it is made to bulge outwards, between the fibres, in those places at which the latter are deficient. I have a preparation of a bladder with several of these cysts, and some of them containing small calculi, which probably had dropped into them, after having made their way into the bladder from the kidney. This, it is true, is taken from a patient who had disease in the prostate gland; but it is evident that the same thing may happen in cases of stricture also, where the formation of cysts in the bladder happens to be combined with a disposition to the production of calculi in the kidneys.

In some cases of stricture, where the disease has existed for a great length of time, abscesses form in the cellular membrane external to the bladder, but communicating with it, similar to those which I have already mentioned as connected with the urethra. A considerable length of time elapses before such abscesses present themselves externally. They point, at last, in the groin, or above the pubes; discharging putrid and offensive pus, and afterwards urine. The formation of these abscesses is attended with

febrile symptoms: a hot skin, a frequent pulse, and a brown tongue; and they are for the most part to be regarded as a sign of approaching dissolution. They are attended with all the marks of chronic inflammation of the bladder, such as I shall describe hereafter.

Stricture of the urethra also lays the foundation, when long neglected, of disease in the kidneys. The kidneys are affected here in the same manner as in cases of disease in the prostate gland, and I may refer you to what I shall have to say on the subject in a future Lecture.

I have said that rigors sometimes occur during the formation of abscess. In this there is nothing remarkable, as rigors mark the formation of abscess under a variety of other circumstances. But rigors also occur in many cases of stricture, independent of abscess. We observe them most frequently in patients from hot climates, especially from the East Indies. They usually recur at irregular periods; being, in many instances, induced by the introduction of a bougie, or by the application of caustic to the stricture. The paroxysm very nearly resembles that of an intermittent fever; and it is more severe where it follows the use of the bougie, than where it occurs independent of it. In general, the cold fit having been followed by a hot fit, and that by a profuse perspiration, the patient is relieved. At other times, however, the constitution is disturbed for a great length of time afterwards; and sometimes the rigor is followed by an attack of

fever, which lasts for several days, or even for some weeks. I met with one case in which a rigor followed the application of caustic to a stricture, and this was succeeded by an attack of mania, which (if my recollection is accurate), did not subside for nearly a month. In another case, a gentleman had laboured under stricture for many years, during which no bougie had ever been made to enter the bladder. I succeeded in the introduction of a small gum catheter; but, in a few hours afterwards, the patient had a rigor. He then remained affected with fever, attended with a rheumatic inflammation of the muscles of the back of the neck. From the effects of the latter he had not recovered a long time afterwards; and I believe that his neck is stiff and drawn to one side even to the present day, many years subsequent to the original attack.

It has been said, that stricture of the urethra produces disease in the testicle. The introduction of a bougie will sometimes bring on acute inflammation of that organ; and there is, perhaps, some reason to believe that chronic inflammation of the testicle occasionally depends on disease of the urethra. It appears to me, however, that the effects of stricture on the testicle have been very much exaggerated by some writers. An hospital surgeon, who is now no more, published a work, in which he expressed himself as if he regarded almost all cases of chronic inflammation of the testicle as being dependent on disease of the urethra, and to be cured by the use of the

bougie. I need make no comment on such a fantastic hypothesis.

Diagnosis in Cases of Stricture of the Urethra.

I shall now suppose that a patient applies to you, believing that he has a stricture of the urethra. Perhaps you find, on enquiry, that the symptoms are equivocal, and you require something more than a mere knowledge of them, to enable you to determine whether a stricture does or does not exist. Or it may be, that the symptoms are so distinct and well marked, that you can have no doubt of the existence of a stricture; still, you wish to know in what part of the urethra it is situated, and what is the degree of contraction. The knowledge that is required in either case is to be obtained by the examination of the urethra with a bougie, or some instrument corresponding to it.

The best kind of bougie is the common one, made of plaster spread on linen, and rolled up. It should be smooth on the surface, and neatly rounded at the extremity. The plaster bougie should be rubbed with the hand until it is made warm, and then bent into the form of the urethra. Thus bent, it is much to be preferred to the elastic bougie, which is made of elastic gum on the outside, but of catgut on the inside. The latter may, it is true, be bent into any form; but it is elastic, and however you may bend it, it always has a tendency to regain its straight

figure: and hence it is not well constructed for being passed along the curved canal of the urethra. The bougie which you use for the purpose of examining the urethra should be of a full size, that is, large enough to fill the urethra without stretching it. A small bougie may deceive you in two ways. It may pass through a stricture, and thus lead you to think there is no stricture when there really is one. It is also liable to have its point entangled in the orifice of one of the mucous follicles of the urethra, or in some accidental irregularity of that canal, thus inducing the belief that there is a stricture, when there is none. If you use a bougie of the size of the urethra, you are not at all liable to the first error, and you are much less liable to the second. The bougie should be cylindrical. There is no advantage in any bougie, except it be a small one, being conical. A conical bougie, becoming larger towards that part which is held in the hand, is likely to extend forcibly the orifice of the urethra, and to excite inflammation in it.

I generally find it best to introduce the bougie with the patient standing, keeping the extremity of it, which you hold in your right hand, close to his groin, and passing it until it will go no further in this direction: then by turning the instrument, I bring it horizontally forwards, and push it gently towards the bladder. If the patient has well-marked symptoms of stricture, and the bougie meets with an obstruction in some part

of the urethra, you may, with good reason, consider this as sufficient to indicate the existence and situation of the disease. If, however, the patient has no such well-marked symptoms, you should not advance at once to the conclusion that there is a stricture, because the bougie does not immediately enter the bladder. There may be some accidental irregularity in the urethra, in which the extremity even of a large bougie may be as it were entangled: or, if you are at all rough in the use of the bougie, a spasm may be induced in the membranous part of the urethra, or in the muscle surrounding it, preventing the bougie from being passed, although no such obstruction exists at other times. Under these circumstances you should introduce a silver catheter, or a metallic sound, having a moderate curve, and warmed to the temperature of the body: and probably, if there be no stricture, the metallic instrument will be readily introduced, although the plaster bougie could not be introduced at all. In short, where there are no decided symptoms of stricture, you ought not to adopt the opinion that a stricture exists, until you have examined the urethra very carefully, and with different kinds of instruments. Inattention to this important rule has led many patients to be subjected to a course of treatment for stricture, who have never laboured under the disease.

There is a fashion in diseases, as in many other matters; or, to speak more properly, there is a fashion in the opinions entertained as to the

prevalence of particular diseases; and when the attention of the medical profession and the public has been especially directed to a certain order of cases, such cases are supposed to be much more common than they really are. A very few years ago it was so with respect to the disease which we have now under our consideration. If a patient had a troublesome gleet; if he had an indurated testicle; if he had a priapism at night; if he had a too frequent inclination to empty the bladder; if he was impotent, or thought that he was impotent; or even if he had an herpetic eruption on the præpuce; these were not unfrequently regarded by himself, and by many surgeons, as a sufficient indication of his labouring under a stricture, and he was subjected immediately to the unnecessary use of bougies. The number of persons who, at this period, were supposed to have a stricture, and who really had no such disease, and many of whom had no disease at all, was even greater than that of the young females who, since then, have been the victims of another not less mischievous delusion. I allude to the cases of young ladies who have been confined to a sofa for some years, with caustic issues in the back or hip, under the impression that they had caries of the spine, or caries of the hip-joint, when, in reality, they have suffered only from hysterical pains and spasms, which air and exercise would have cured; but which confinement and nursing, and the attendance of physicians and surgeons, have

aggravated. I dwell on this subject because I am anxious that none of you should fall into an error which is so injurious to society, and which would be so discreditable to yourselves.

Treatment of Retention of Urine from Stricture.

It frequently happens, that when first you are called to a patient with stricture of the urethra, it is on account of his labouring under a retention of urine in the bladder. At all events, this, when it occurs, is the circumstance demanding your first attention; for here the patient is in a state of immediate danger, and you are to stand between him and destruction. Under these circumstances you have no time to pause, and deliberate, and consider. Your patient is suffering torture; he and his friends are in a state of the greatest possible anxiety and alarm: and it is important that you should have a perfect knowledge of all the remedies which are likely to be useful, so that you may be enabled to make an immediate application of them for his relief.

You will observe, that the causes of retention of urine are various. Stricture of the urethra is only one of them. The treatment which is applicable to retention arising from one cause, is not applicable to retention from another cause. The observations which I am now about to make, relate exclusively to retention of urine from stricture.

I have heard it recommended, even by some experienced surgeons, that in these cases you should bleed your patient, that you should direct him to be put into the warm bath, and that certain other means should be employed, before you attempt to relieve him by the introduction of a bougie or catheter. But this recommendation does not correspond with what my own experience would suggest. The cause of the retention is local, and in the greater number of cases you will succeed in enabling the patient to empty the bladder by mechanical means. The plan which I would recommend you to adopt is the following: —

Begin by taking one of the smallest gum catheters, which has been kept for a considerable time on a curved iron wire, and which retains the curved form after the wire is withdrawn. Introduce it without the wire, and, as it approaches the stricture, turn the concavity of the catheter towards the pubes, elongating the penis at the same time by drawing it out as much as possible. It is not very improbable that it will pass through the stricture, and enter the bladder. The urine will then flow through it in a fine stream, and the patient will obtain immediate and complete relief.

If you fail with the small gum catheter, try not a plaster, but a small catgut bougie. Let this be well made, that is, firmly twisted, nicely rounded at the extremity, and every where well polished. Observe the same rule of elongating the urethra as much as possible, and it will pro-

bably enter the stricture. It is not necessary that the catgut bougie should pass on to the bladder: it is sufficient if the stricture grasps, or holds it. Let it remain in the stricture until there is a violent impulse to make water. Then withdraw the bougie, and the urine will follow it in a small stream. If the patient empties the bladder, the object is attained; but, otherwise, re-introduce the catgut bougie, or rather introduce another of the same size: for a catgut bougie which has been once used is not fit to be employed a second time. Let the patient retain this second bougie as long as he can. If the straight catgut bougie cannot be passed, you will often succeed in effecting its introduction by bending the point of it thus: —



This contrivance enables you to keep the point against the upper surface of the urethra, avoiding the lower part, in which the obstruction is always most perceptible, and in which the bougie is most likely to become, as it were, entangled.

Even where you have failed to relieve the patient by means of the catgut bougie, you will often succeed in introducing a silver catheter, or an elastic gum catheter, mounted on a firm iron stilet, into the bladder. The catheter, employed

on this occasion, if the stricture be of recent formation, should be nearly of the full size of the urethra; but if the stricture has been of long duration, it should be considerably smaller. The common silver catheter is not so well adapted for the purpose as that which I now show you. You will observe that it is shorter and less curved than usual; and that the tube is fixed in a wooden handle, which renders the instrument more manageable than it would be otherwise. If you use an elastic gum catheter, the iron stilet should have a flattened handle, resembling that of a common sound. You should pass it as far as the obstruction, and having ascertained where it is situated, withdraw the catheter a little, half an inch, for example, and then, as you pass it on again towards the bladder, keep the point sliding against the upper part of the urethra, which is towards the pubes, avoiding the lower part, which is, of course, towards the perineum. Be careful to employ no violence. If you lacerate the urethra, so as to cause hæmorrhage, you will be defeated in your object. Press the catheter firmly, but gently and steadily, against the stricture, keeping in your mind the anatomical position of the parts, and being careful to give the point of the instrument a right direction. When the pressure has been thus carefully continued for some time, the stricture will begin to relax. It will allow the point of the catheter to enter, and, at last, to pass completely through it

into the bladder. In some instances this will be accomplished in the space of one or two minutes; while, in others, it may be necessary to persevere for five or even ten minutes. As soon as the catheter has reached the bladder, the patient's sufferings are at an end, as the bladder becomes completely emptied. If you have used the elastic gum catheter, it may be prudent to allow it to remain in the urethra and bladder for one or two days, or even for a longer period; and this will go far towards accomplishing the cure of the stricture.

If you are skilful and prudent in the management of the catheter, you will generally succeed in introducing it into the bladder; but if you fail in doing so, the attempt to introduce it may still be useful to the patient. The pressure of it against the stricture, if kept up for a considerable time, exhausts the morbid irritability of the diseased portion of the urethra. The spasm becomes in a considerable degree relaxed, and, if you withdraw the instrument when the patient has a violent impulse to make water, the urine will follow in a stream. Observe, that I am taking it for granted that you are careful to avoid all violence. If the membrane of the urethra be lacerated, the probability is, that the spasm will not give way; and if, under these circumstances, you persevere in the attempt to introduce the catheter, you will but aggravate the evil which it is your object to remove.

The remedy on which you are most to rely, where these mechanical means fail, is opium. From half a dram to a dram of laudanum may be given as a clyster in two or three ounces of thin starch. If this does not succeed, give opium by the mouth, and repeat the dose, if necessary, every hour until the patient can make water. According to my experience, the cases in which the stricture does not become relaxed under the use of opium, if administered freely, are very rare. The first effect of the opium is to diminish the distress which the patient experiences from the distention of the bladder. Then the impulse to make water becomes less urgent; the paroxysms of straining are less severe and less frequent; and after the patient has been in this state of comparative ease for a short time, he begins to pass his water, at first in small, but afterwards in larger quantities.

It is customary in these cases to employ the warm bath. It is, indeed, sometimes useful, but you can place no dependence on it as compared with opium. It is not sufficient that your patient should sit in a hip bath; the bath, to be at all efficient, must be complete; his whole person ought, therefore, to be immersed, and he should remain in it for half an hour, or an hour, or longer, unless he previously becomes faint. Bleeding from the arm is seldom required in cases of retention of urine from stricture: but, in some instances, even where other means

have failed, taking blood from the perineum, by cupping, gives immediate relief.

Purgatives require some time to produce their effect, and, in most cases, at the period of your being called in, the symptoms are too urgent to admit of this delay. Where, however, a stricture is chiefly spasmodic, and the retention follows the too great use of fermented liquor or spirits, I would advise you, if you are sent for on the commencement of the attack, to prescribe a draught of infusion of senna with the tartrate of potass and tincture of jalap. As soon as this has fully operated, and the bowels are emptied, give thirty or forty drops of tincture of opium by the mouth, or order an opiate clyster to be administered, and, in all probability, the attack will subside.

After all, there is no absolute rule as to the treatment of retention of urine from stricture. One person is relieved in one way, another in another; and you will do well in each case, to bear in mind the particular mode of treatment which has proved of service, in order that you may at once resort to it, if you are called a second time to the same patient, under the same circumstances. In one instance, you will be able to pass a catgut bougie, and not a catheter; in another, you will be able to pass a catheter, and not a catgut bougie. One individual is relieved by opium; another by the warm bath. A gentleman of my acquaintance, who was subject to

attacks of this description for a considerable time, almost always began to make water after a pint of warm water had been thrown up as a clyster. To show what various treatment is necessary, I am in the habit of mentioning the following case. A gentleman, who had been long in hot climates, laboured under an old stricture of the urethra. He was able to pass a bougie for himself; and he did this at regular periods, and for a long time experienced little or no inconvenience from his disorder. One night, however, he was seized with retention of urine, and called me out of my bed in consequence. I introduced a gum catheter, which entered the bladder with perfect ease, and drew off his urine. He called me up another night, and another, and another still: and one night he called me up twice. At last, it occurred to me that he always sent for me on the alternate nights; and on enquiry, I found that the attack of retention regularly came on about twelve o'clock, and even though the catheter had entered the bladder, the spasm did not relax, so as to enable him to make water by his own efforts, until five or six in the morning. I determined then to treat the case as we do many other intermitting and periodical diseases; and I prescribed him the sulphate of quinine. The first night after he began to take it he had an attack of retention; but he had no attack afterwards.

Now let us suppose a case in which you have

tried all the methods which I have described, to no purpose. The bladder becomes more and more distended, the patient's sufferings go on from bad to worse. Are you to leave him to suffer and die? By no means. You may puncture the bladder itself; or you may make an opening into the urethra behind the stricture; and thus prevent the catastrophe which would otherwise be inevitable.

Four different operations may be resorted to for the purpose of drawing off the urine when it cannot be voided through the natural passage. The bladder may be punctured above the pubes; or from the rectum; or from the perineum; or the urethra itself may be punctured between the stricture and the prostate.

It is not my intention at present to describe the steps of these operations: but I shall nevertheless make a few observations respecting them. You may prefer one operation to the rest, but you will not be able in practice to resort to one exclusively. Your choice must be influenced by the peculiar circumstances of each individual case. If the patient be thin, and the bladder much distended, and very prominent in the abdomen, you may very safely puncture it above the pubes: but if the patient be corpulent, this operation will be difficult; and if the bladder be contracted, it will be impracticable. If the bladder be much distended, and the prostate of its natural size, you may puncture it from

the rectum; but if the bladder be contracted, or the prostate much enlarged, this operation will be at the same time troublesome and dangerous. The puncture of the bladder from the perineum is so serious and severe an operation, that scarcely any surgeon of the present day (as far as I know) recommends it to be done, except in particular cases, where no other operation can well be performed. As to the puncture of the urethra between the stricture and the prostate, it is true that a surgeon who is quite conversant with the anatomy of the perineum, if he proceeds carefully, will be able to accomplish it in a thin person; but a surgeon who has been living where he has had no opportunity of keeping up his knowledge of this part of anatomy, will not find it a very easy task to cut down on the membranous part of the urethra when neither sound nor catheter can be introduced into it to point out its situation; and in a fat person with a deep perineum, I suspect that this operation will sometimes perplex even the best anatomist. On the whole, from what I have seen, I am inclined to recommend the operation of puncturing the bladder from the rectum; that is, in those cases where the bladder is much distended and the prostate healthy. The operation is simple, free from pain and danger. After the trocar is withdrawn, the canula may be allowed to remain for the next day or two. By the time that the canula

is removed, the sides of the wound will have become agglutinated, and it may, perhaps, continue as a fistulous communication between the bladder and rectum until the stricture is cured At least this happened in one instance; and thus I was enabled to cure one of the most distressing cases of stricture which I ever had under my care. The patient was a middle-aged gentleman, who had laboured under stricture from his boyhood. The use of the bougie induced a secretion of ropy mucus in such quantity as to fill up the urethra, and to be in itself a material impediment to the passage of the urine. Often it occasioned a complete obstruction of the urethra, and a retention of urine. In one of these attacks of retention, I punctured the bladder, from the rectum, and the wound, as I have mentioned, became fistulous. Now, whenever the stricture was more closed than usual, the bladder was relieved through the fistulous passage, and the urine came away by the rectum. The secretion of the ropy mucus ceased: there was no recurrence of the retention of urine. Nothing now interfered with the necessary operations on the urethra, and the dilatation of the stricture was easily accomplished.

It may be further observed respecting this operation of puncturing the bladder, that it is impossible to lay down any general rule as to the period beyond which it ought not to be delayed. You must exercise your own judg-

ment, taking into consideration all the circumstances of the particular case before you. Sometimes there will be no reason for resorting to it until after the lapse of three or four days; and at other times it ought to be performed within thirty-six hours, or even sooner.

After all, however necessary it may be to the safety of the patient in some instances, it is an operation that is very rarely required. Surgeons who see a great number of cases of retention of urine may be called on to perform it in a few instances. Those, who perform it frequently, must often perform it unnecessarily; at least this is what I should say, judging from my own experience.

Where the urethra has given way behind the stricture, and the urine has become effused into the cellular texture, very prompt and vigorous measures are necessary: delay is fatal. I remember the time when five out of six of those patients, in whom this mischief took place, perished; but now, from the more active treatment employed, the great majority recover.

I have already mentioned, that the escape of the urine is followed by a relaxation of the stricture. You will, probably, now be able to introduce a catgut, or some other bougie (a catgut is best), through the stricture into the bladder. If you can do so, it is so much the better. Introduce the bougie; let the patient be held in the position in which you would place him for lithotomy; make an incision in the perineum; feel

for the catgut bougie, make an incision on it, and, of course, you make an opening in the urethra. Through this opening, the catgut bougie serving you as a director, introduce a short gum catheter from the wound in the perineum into the bladder. You will generally find, although the effusion of urine has taken place, that there is still a large quantity of urine left in the bladder. Of course it is drawn off by the catheter, and the bladder is emptied. Allow the catheter, however, to remain in the wound and in the bladder. Then make extensive scarifications or incisions through the skin, wherever the urine has been effused underneath, and let these incisions extend to the sloughs of the cellular membrane. Apply a poultice: let the parts be fomented twice or three times daily. After one or two days you may remove the short gum catheter, which, in the mean time, has kept the bladder empty. Your treatment of the patient, in other respects, must depend on his symptoms and general condition. At first, it is often right merely to give some saline medicine, with small doses of Dover's powder every six or eight hours: afterwards it will be proper to exhibit wine, ammonia, opium, and, perhaps, bark, or the sulphate of quinine: in other cases opium, cordials, and tonics, will be required in the beginning. As soon as the sloughs begin to separate, remove them with a pair of forceps, and dress the sores according to circumstances.

In those cases of effusion of urine in which you are unable to pass an instrument into the bladder, you must be contented (as to the local treatment) with making extensive scarifications. Here the patient labours under a disadvantage, in consequence of the bladder remaining loaded with urine; but, nevertheless, if the scarifications are made at an early period, he usually recovers.

LECTURE III.

Cure of Stricture.

It having been ascertained that a stricture exists, you are to consider in what manner it may be relieved or cured. The question has been often put to me, how do you treat strictures of the urethra? I answer that I have no particular method. There are several methods of managing this disease. Sometimes I adopt one, sometimes another, according to the peculiar circumstances of the case. I shall describe to you the different plans of treatment to which you may have recourse, endeavouring at the same time to point out the particular cases to which each of them is applicable.

I should premise that the disease is not to be cured by medicine. There is only one class of cases in which medicine is of essential service. These are cases of spasmodic stricture induced by sand in the urine, by the formation of a number of small calculi, or even by a too abundant formation of lithic acid, which is not deposited in the form of sand or gravel. Here attention to the diet and mode of life, and the exhibition of purgatives and alkalis, and such

other remedies as tend to restore the urine to a healthy condition, will be of essential service, and will enable you to cure the stricture with the bougie, when you would in vain have attempted to do so otherwise. In all cases it is of consequence that the patient should lead as regular and quiet a life as possible, that he should avoid much bodily exertion, exposure to damp and cold, and all excesses in eating or drinking. Attention to these points will not, it is true, cure the stricture, but it will enable you to apply those remedies, by which it may be cured, with greater advantage. The bowels should be kept open, and whenever there is an unusual degree of irritation, Dover's powder, or some other opiate, may be exhibited, either by the mouth or by clyster.

The methods which are chiefly useful in the cure of stricture are, 1st, the dilatation of it by means of the common plaster bougie: 2dly, the dilatation of it by the metallic bougie or sound: 3dly, the retention of the elastic gum catheter in the urethra and bladder; and, 4thly, the application of the bougie armed with the nitrate of silver. Each of these methods requires a separate consideration.

1. The common plaster bougie, if of a small size, should be of a conical shape, but if of a middle size, or of a full size, it should be cylindrical. Ascertain the size of the stream of urine, and introduce a bougie of this size, whatever it may be. If the bougie be very small it may be

used straight, otherwise it should be always curved like a catheter, but in a less degree. Neither you nor your patient are to be disappointed because the bougie does not enter the stricture at the first trial. In some cases this will not happen until you have seen your patient three or four times; and in very difficult cases the delay may be still greater than this. When a bougie has once entered the stricture and bladder, allow it to remain for a few minutes. In two or three days (not sooner) introduce either the same bougie, or one of the same size. Then withdraw it and introduce one of a size larger. Allow this also to remain for a few minutes, and in two or three days more repeat the operation. Thus, by degrees, you dilate the stricture until it is of the same diameter with the rest of the urethra. This method of curing strictures is applicable to a great number of cases; and wherever it will answer the purpose, I would advise you to resort to it in preference to other methods. The common bougie gives the patient little or no pain; it excites no irritation, unless it be introduced clumsily or rudely; and it can do no harm by penetrating or tearing the membrane of the urethra.

2. The cure of a stricture by the use of metallic sounds or bougies is conducted on the same principle as that by the common bougie; that is, the instrument is intended to penetrate through the stricture, which, by the introduction of larger and larger instruments, is to be gradually dilated.

I do not recommend to you those, which are sold under the name of the flexible metallic bougies. These are, in fact, too flexible, and liable to lose the shape, which you have given them during their introduction. Those which I have, of a small or middle size, are made of silver; the larger ones may be made of steel, or of steel plated, or of a composition similar to, but firmer than, that of the flexible metallic bougie. These sounds should be very slightly curved, and not more than eight and a half or nine inches in length, exclusive of the handle. Sometimes you will find it best to introduce them without turning, that is, with the concavity towards the patient's abdomen. At other times you will pass them more readily by keeping the handle, in the first instance, towards the patient's left groin, giving the instrument a half turn afterwards as it approaches the stricture. In either case, if you wish to avoid making a false passage, take care that the point is kept sliding, as it were, against the upper surface of the urethra. Press the instrument steadily and firmly against the stricture, in the expectation that it will gradually become dilated, and allow the point to enter it. Then pass the instrument into the bladder, provided that you can do so readily, and without the application of force, but not otherwise. Two or three days afterwards (the interval ought in general to be as much as this, and sometimes longer) introduce the sound which has been passed before; withdraw it, and introduce an-

other of a size larger; and thus you go on dilating the stricture in the same way as with a common bougie. Never use one of the very small metallic instruments if you can avoid it. Always try a small bougie first; and, if possible, begin the dilatation of the stricture with the latter, deferring the use of the metallic instrument until the stricture is so far dilated as to give you a right to expect that a sound of a moderate size may be passed. If a small bougie cannot be made to enter the stricture, and you are under the necessity of beginning the cure by means of a small metallic instrument, you must use it with the greatest caution, bearing in mind that it is to be made to pass, not by force, but by gentle and dexterous management. Want of caution in this respect, will lead to the instrument's perforating the membrane of the urethra, and penetrating into the cellular membrane of the perineum, or even into the rectum. This ought not to happen. But it is desirable that we should be prepared for all contingencies; and it is worth while for you to consider what course you will pursue, if the metallic instrument has taken a wrong direction. Desire the patient to remain as quiet as possible. Let him continue in a horizontal posture on a sofa. Make no farther trial with an instrument for a week, or even for a longer period. The parts which have been lacerated will then have time to become healed; whereas, if you persevere in the use of the sound, you

will in all probability subject the patient to the inconvenience of a permanent false passage, in consequence of the instrument's taking the same wrong direction which it had taken before.

The cases in which you will find this method of treatment by means of metallic sounds preferable to that by means of the common bougie, are the following:—1st, Cases of old gristly or cartilaginous strictures, which the common bougie is incapable of dilating: 2dly, Cases in which, in consequence of some improper management, a false passage has been formed, into which a common bougie is likely to penetrate, but which the metallic instrument may be made to avoid: 3dly, Some recent cases, in which the smooth, polished surface of the metallic bougie gives less pain to the urethra, and is less likely to induce spasm than the softer, but less polished, substance of the common bougie. The temper of the urethra varies as much as the temper of the mind. Where circumstances appear to be the same, you will find one method of treatment to suit one case, and another to suit another case; and it will often happen that you cannot determine, beforehand, which method it will be best to adopt.

III. In treating a stricture with the gum catheter, you are to introduce it, and allow it to remain day and night in the urethra and bladder. If the patient can bear it to be retained for a sufficient length of time, the stricture will become dilated, not only to the size of the instrument

employed, but to a size considerably larger. Perhaps you will be able to introduce the catheter without the wire or stilet. Do so, if possible. If not, you should employ one mounted in the way which I have already explained, on a strong, unyielding iron stilet, having a flattened iron handle, like that of a common sound or staff. Being so mounted, it is more readily directed into the bladder than when mounted in the usual way, on a piece of thin flexible wire. When the gum catheter has entered the bladder, withdraw the stilet, and leave the catheter, with a wooden peg in its orifice, which the patient is to take out whenever he has occasion to void his urine, it being at the same time secured by a suitable bandage. After three or four days you may withdraw the catheter for twelve hours; or if much suppuration is induced in the urethra, you may withdraw it for a longer period. Then introduce another catheter larger than the first; and thus you may, in the course of ten days or a fortnight, dilate a very contracted urethra to its full diameter. This is a very certain and expeditious method of curing a stricture. You may by these means sometimes accomplish as much in the course of ten days, as you would accomplish in three months by the occasional introduction of a bougie. This method is particularly applicable,

1st, Where time is of much value, and it is of great consequence to the patient to obtain a cure as soon as possible;

2dly, Where a stricture is gristly and carti-

laginous, and therefore not readily dilated by ordinary methods;

3dly, Where, from the long continuance of the disease, the urethra has become irregular in shape, or where a false passage has been made by previous mismanagement. Under these circumstances, if you can succeed in introducing a gum catheter, and let it remain for a few days in the bladder, you will find your difficulties at an end; the irregularities will disappear, and the false passages will heal.

4thly, There is still another class of cases in which this method of treatment is particularly useful. I allude to those in which a severe rigor follows each introduction of the bougie. This disposition to rigor is such, that it is sometimes impossible to proceed with the treatment in the ordinary way. Observe, in these cases, when the rigor takes place. It seldom follows the use of the bougie immediately. It almost always takes place soon after the patient has voided his urine, and seems to arise not as the immediate effect of the operation, but in consequence of the urine flowing through the part which the bougie has dilated. Now, if, instead of a bougie, you use a gum catheter, and allow it to remain, the urine flowing through the catheter, the contact of it with the urethra is prevented, and the rigor is prevented also. I have no right to say that this plan will invariably succeed, but I assure you that it has very rarely failed in the cases in which I have resorted to it.

IV. It remains for us to consider the treatment of a stricture by the application of caustic. This mode of treatment was first proposed by Mr. Hunter, who recommended it in particular cases. The more general application of the caustic to strictures was introduced by Sir Everard Home, with whose valuable work on the subject of this disease you ought to be well acquainted. The caustic to be employed is the nitrate of silver. Let a piece of it be inserted neatly into the extremity of a bougie. The round end of the bougie should be cut off, and the caustic should be as large as the bougie will carry. The armed bougie should be as large as the urethra will admit without being forcibly distended. First pass a common bougie down to the stricture, and mark with your nail on the bougie the distance of the stricture from the external orifice of the urethra. Then measure off the same distance on the armed bougie; pass it down to the stricture, and keep it pressed against it with a firm, heavy hand, during the space of a quarter of a minute, and sometimes for a longer time. Let this be repeated, if necessary, every third or fourth day; for every second day, as some have recommended, is according to my experience much too often. If you do not press the bougie firmly against the stricture, the caustic is applied to the urethra anterior to the stricture, and not to the stricture itself. The first effect of the caustic is to cause the stricture to become dilated to a certain extent,

probably by relieving whatever disposition there is in it to spasm. It is a strong stimulus applied to a part which is morbidly irritable, and the morbid irritability becomes exhausted. The benefit which the patient derives immediately from the application of the caustic is sometimes very remarkable. He may apply to you, making water in a stream like a thread, or only in drops; you apply the caustic, and in a few minutes afterwards he has a desire to discharge the contents of his bladder, and he finds that the urine flows in a very considerable stream. After this, any farther benefit to be produced by the caustic must be the result of the destruction of the stricture by the repeated formation of sloughs. But this is a tedious and difficult process, especially in cases of old cartilaginous stricture. In fact, there are very few such cases in which a cure can be effected by the caustic alone, however long you may persevere in its use; and whenever the caustic is frequently employed, you are in danger of creating a false passage, in consequence of the dissolved caustic flowing to the lower part of the urethra and destroying the parts unequally.

The cases to which this method of treatment is applicable are, 1st, Those of spasmodic stricture, where two or three applications of the caustic may be sufficient to relieve all the urgent symptoms. 2dly, Some cases of old stricture, in which the stricture still retains considerable disposition to spasm. In these last cases apply the

caustic two or three times, and no oftener. It will probably relieve the contraction as far as it is spasmodic, and thus enable you to proceed more advantageously with the use of the bougie or metallic sound. 3dly, The caustic may be used very properly in some cases of stricture which are endowed with peculiar irritability, in which every application of the common bougie induces severe pain, or brings on spasm, preventing it entering the stricture. Two or three applications of the caustic may be sufficient to deprive the stricture of that unnatural sensibility, which otherwise would have foiled your efforts to effect a cure.

Notwithstanding what I have now stated, I very rarely use the armed bougie in my own practice, and I never resort to it in the first instance. My reasons for preferring the other methods of treatment in ordinary cases are these: 1st, Although the caustic often relieves spasm, it also very often induces it. It is true, that in many instances it enables a patient to make water with more facility; but in many instances, also, it brings on a severe retention of urine. 2dly, Hæmorrhage is a more frequent consequence of the use of the caustic than of the common bougie, and it sometimes takes place to a very great, and to an almost dangerous extent. 3dly, Where there is a disposition to rigors, the application of the caustic is almost certain to produce them; and frequently the application of the caustic induces rigors, where there had

been no manifest disposition to them previously. 4thly, Unless used with caution, the application of caustic may induce inflammation of the parts situated behind a stricture, terminating in the formation of abscess. I have known several cases of abscesses formed under these circumstances, which, from their peculiar situation, have proved more troublesome and more difficult to manage than the original disease. In one case, which came under my observation many years ago, and in which, from the account given me, I was led to believe that a surgeon had been too liberal in his application of caustic to a stricture, a succession of abscesses took place extending in various directions, even to the nates, and attended with great disturbance of the constitution. The patient went into the country, where, as I have been informed, he ultimately sunk under the combined effects of the stricture and abscesses.

These are the principal evils which follow the use of the caustic; but there are other arguments against it in particular cases. If the bougie has been improperly used, and a false passage has been produced, or if there be the beginning of a false passage, the dissolved caustic will penetrate into this false passage, and aggravate the mischief, instead of destroying the stricture. In cases of old stricture, where there is much alteration in the structure of the parts, the caustic is absolutely inadequate to the cure; and in many other cases, although the caustic may effect a

cure at last, it does so by a very tedious process, and a cure would be effected in a much shorter space of time by the introduction of the metallic sound, or the retention of the gum catheter.

There are still some other methods of treating stricture, but what I have to say concerning each of them may be comprised in a few words. Mr. Arnott has invented what he calls a dilator, made of a tube of varnished silk, which is to be introduced into the stricture, and then dilated by impelling air into it with a syringe. The contrivance is ingenious; and I should think it very likely to be useful, where you wish to dilate the female urethra for the purpose of extracting a calculus. It may be useful, also, in dilating the orifice of an abscess or sinus, being used instead of a sponge tent. But it does not appear to me that either this, or a steel dilator, which I remember that some one invented formerly, is likely to render us much assistance in the cure of a stricture. Such a dilator must be of a certain size. It cannot be supposed to be less than a middle-sized bougie. Now, if you can manage to introduce a bougie or sound of a middle size into a stricture, the farther dilatation of it is easy enough, the cure may be said to be all but accomplished, and neither of the dilators is wanted. On the other hand, if the stricture is much contracted, the introduction of the dilator will be impossible.

Mr. Stafford has invented an ingenious machine, which is intended to divide a stricture by

means of a cutting instrument. I dare say that cases may occur in which such an instrument may be useful, but I have had no actual experience of it.

It has been proposed, in cases of very old and neglected stricture, to cut down on the urethra in the anterior part of the perineum, and to divide the stricture with a knife, introducing a gum catheter afterwards through the urethra into the bladder, and allowing the wound to heal over it, so as to effect a cure, not by dilatation but by incision. I have heard of this operation having been performed in several instances: in the greater number of cases the performance of it was a work of difficulty; and in some of them the patient was sent to bed without its being completed. I suppose that no surgeon would think it right to recommend such an operation, if he were able to introduce any kind of instrument through the stricture into the bladder; and it is evident that, if it be performed where no instrument can be passed, the operation must be at once severe and difficult. But I have little farther to say respecting it, as I must candidly inform you that I have never performed it. In fact, the cases in which it ought to be resorted to are, as I conceive, *very rare indeed.* Setting aside those patients who are actually dying, there are very few cases in which, by perseverance and patience, and dexterous, and, above all, by gentle management, you may not at last pass an instrument into the blad-

der. Of those who have been under my own care, there have been two only to whom it appeared to me right to recommend this operation. Each of these patients had fistulæ in perineo, through which a sufficient quantity of urine passed to prevent a retention of urine; and not suffering, therefore, so much as those suffer in whom no fistulæ exist, they declined submitting to the operation which was proposed.

In many cases of stricture, especially where the disease has existed for several years, you find, that although a bougie may be passed through the contracted part of the urethra, it will not enter the bladder. You may possibly succeed in the introduction of a metallic sound, or catheter, where you have failed to introduce a bougie; but not unfrequently the obstruction which has prevented you from passing the bougie will prevent you from passing the metallic instrument also. The obstruction in these cases arises from the irregularity of the surface of the urethra, where it is surrounded by the prostate gland, the immediate causes of which I have already described, and sometimes from enlargement of the prostate gland itself. If you use violence, or employ any but the gentlest treatment, you lacerate the membrane of the urethra and the substance of the prostate. You make a false passage leading into the space between the bladder and the rectum, which may prove a source of constant trouble and perplexity afterwards. When you meet with the difficulty

which I have mentioned, do not be over anxious immediately to overcome it. It is not the original disease, but the effect of the stricture. Remove the cause, and the effect will cease, not indeed at once, but by degrees. Be contented at first with the dilatation of the stricture. The urine will then flow in a full stream, and the pressure of it on the parts behind being removed, they will regain their healthy condition; so that at last the catheter, or even the common bougie, will enter the bladder readily.

I say that you are not, under the circumstances which I have described, to use violence. But I cannot too strongly impress it on your minds, that, in the treatment of stricture, you ought not to use violence under any circumstances. Your success in the cure of this disease will depend very much on your attending to this important rule. Whether you use a bougie, or a sound, or a catheter, let the instrument be held lightly, and, as it were, loosely in your hand; it will then, in some measure, find its own way, in that direction in which there is the least resistance; whereas if you grasp it with force, the point can pass only where you direct it, and it is just as likely to take a wrong course as a right one. A stricture will invariably resent rough usage: it will yield to patience and gentle treatment.

In a few cases of incipient stricture, and in some of those in which a stricture is merely spasmodic, after a bougie has been used for a

certain length of time, the use of it may be dispensed with, and there is no recurrence of the stricture. But these cases are exceptions to the general rule, which is, that there is danger of a relapse, and that a patient, who is desirous of continuing well, must submit to the occasional use of the bougie ever afterwards. I generally instruct the patient in the introduction of it for himself. At first he may introduce it once in three or four days. He may afterwards use it at longer intervals, and he must take some pains to determine what those intervals should be. One person will find it necessary never to omit the use of the bougie for a longer period than a week, and another will not have occasion to resort to it oftener than once in a month or six weeks.

The management of a case of stricture in which the patient is liable to attacks like those of intermittent fever, is often very perplexing. Occasionally, every introduction of a bougie is followed by a rigor, which is not only distressing to the patient at the time, but leaves him in a state of debility from which he may not recover for several days. And sometimes the rigor, as I have already explained, is only the precursor of a still worse train of symptoms, assuming the character of simple continued fever, of rheumatic fever, or even of mania. It is impossible to continue the use of the bougie under these circumstances. If you would cure the stricture, you must prevent the rigors. I have already

mentioned one way of attaining this object, namely, by leaving the gum catheter in the bladder. You may also, in many instances where you expect the occurrence of a rigor, anticipate the attack by giving your patient a dose of opium, either by the mouth, or in the form of clyster, immediately after you have introduced the bougie. But you are not to be contented with meeting the present difficulty. You should look to the future, and endeavour to correct that state of the system on which the disposition to rigors depends. For example, I was sent for to see a gentleman who had long suffered from a stricture of the urethra, and who was at the time labouring under a severe attack of retention of urine. I drew off his urine with a small elastic gum catheter, which was passed with the greatest facility into the bladder. In the course of two or three hours he experienced a desire to void his urine. It flowed readily in a stream, but immediately afterwards he was seized with a violent rigor. He remained feverish for a day or two, and then recovered. After a few days had elapsed, I began the dilatation of the stricture with a common bougie. The bougie was introduced without any difficulty, but it was followed by a rigor. The next time that the bougie was employed, there was a third attack of the same kind; and on the bougie being again resorted to, another and another rigor followed. I now omitted for a time the use of the bougie, and prescribed two grains of the sulphate of quinine

to be taken every six hours. Under this treatment my patient's general health manifestly improved, and when, at the end of a week or ten days, we had recourse again to the bougie, there was no recurrence of the rigors.

The treatment of fistulæ in perineo, or of those fistulæ which open externally on the scrotum, or nates, or elsewhere, communicating with the urethra behind the stricture, is in most instances very simple. You are not to be misled, by the resemblance in the name, into the belief that these fistulæ require any treatment corresponding to that which is required for *fistulæ in ano*. The latter are formed among muscular structures, and for the most part in the substance of the sphincter muscle. A fistula in ano requires to be freely laid open, because it is the action of the muscular fibres over it and under it that prevents it healing. The division of the muscular fibres sets them at liberty, and places the fistula under the same circumstances with an ordinary sore. But a *fistula in perineo* is prevented from healing, not by the action of muscles, but by the urine flowing through it. You will put your patient to unnecessary pain by laying it open. The urine will flow through it still, and, in fact, in more abundant quantity. The wound will heal to a certain point, and then the patient will be in the same state as he was in before. Dilate the stricture, let the urethra be restored to its natural diameter, and as soon as the urine passes freely through the natural

passage it will cease to flow through the artificial one; and this being accomplished, the fistula will immediately heal. Sometimes it will heal before the dilatation of the stricture is completed, when the cure of it is only half performed. In other cases the healing of the fistula will be gradual, and it will be necessary to persevere in the occasional use of the bougie for many months before it is completely closed. If the fistula should not heal under this negative treatment, you may resort to other methods. Let the patient remain for three weeks in bed, with the gum catheter constantly retained in the urethra and bladder. This will sometimes succeed, but it will at other times fail. It may fail, 1st, when the opening by which the fistula communicates with the urethra is unusually large: 2dly, where the urine, instead of passing through the catheter, flows by the side of it: and, 3dly, where the instrument brings on an abundant suppuration of the urethra; in which case the purulent discharge finds its way into the fistula, and prevents its healing as much as it would be prevented by the contact of the urine. When, then, this method fails, or when your patient finds it impossible to make that sacrifice of time, and submit to that degree of confinement, which it requires, you may instruct him in the use of the catheter, and advise him, for some time to come, never to void his urine by his own efforts, but to draw it off by the catheter. You may also stimulate the bottom of the sinus by

the occasional introduction of a small piece of the nitrate of silver: at the same time that you retard the healing of the orifice of the sinus, by lightly touching it once in a week or fortnight with the caustic potass. The reason for applying the caustic potass is as follows: — The external orifice of the fistula is always more inclined to heal than the bottom of it towards the urethra. If you stimulate the whole of the fistula with the nitrate of silver, the orifice of it is likely to close prematurely, that is, before it is healed at the bottom. The necessary consequence of this is another abscess and another discharge of matter. By applying the caustic potass to the external orifice you prevent this from healing, while the application of the nitrate of silver promotes the growth of granulations within, and the cicatrisation of the more deep-seated part of the fistula.

On some other Diseases of the Male Urethra.

There are some other affections of the male urethra, which in a greater or less degree obstruct the flow of urine, but which are to be distinguished from that disease to which our attention has been hitherto directed. The orifice of the urethra may become preternaturally contracted, whilst there is no stricture in any other part of the canal. The contraction of the orifice is sometimes the primary disease, but it is more

frequently to be traced to an extensive ulceration of the glans. If such an ulceration has existed, the whole circumference of the external meatus having been included in it, at first when the parts are healed the patient makes water in a stream of moderate diameter; by degrees, however, the cicatrix becomes more and more contracted, the urine flows in a smaller and a smaller stream, and at last it is voided with great difficulty, and only in drops. Very probably you are not called in until the disease has arrived at the last stage, that is, not until there is a complete retention of urine. The treatment of such a retention is very different from that of a retention from an ordinary stricture. There is here no disposition to spasm: the contraction is altogether permanent. The management of the case is in some instances rendered more complicated by the circumstance of the præpuce having contracted partial adhesions to the surface of the glans, at the same time that there is a complete phimosis. Where this complication exists, you must begin with dividing or slitting up the præpuce. You then find the exposed surface of the glans, in all probability, presenting the appearance of an irregular cicatrix, in which you at last discover, not without some difficulty, the minute and contracted orifice of the urethra. Into this orifice introduce a small silver probe, such as is made to be inserted into the punctum lachrymale of the eyelid. Having withdrawn this, introduce an-

other probe of a somewhat larger size; then one a little larger still; and afterwards insert a common silver director about one or two inches into the urethra. The patient will then be able to make water, the urine flowing along the groove of the director. After the bladder is emptied, introduce the point of a straight bistoury along the groove of the director, and divide the contracted orifice of the urethra. Let the patient retain a gum catheter in the urethra and bladder until the incision is healed. He will then make water without the smallest difficulty or impediment: but observe that the cicatrix has the same disposition to contract as before; and in order to prevent the contraction again taking place, a bougie about two inches long should be introduced into the urethra every morning, and allowed to remain there about five minutes each time.

The urethra is, as you well know, surrounded by mucous follicles, which secrete a mucus by which the canal is lubricated. In some cases, one of these follicles becomes converted into a small indurated tumor, varying from the size of a pea to that of a horsebean. Such a tumor is to be felt, imbedded as it were in the corpus spongiosum. The usual situation of it is about two or three inches from the external orifice, but it is sometimes perceptible close to the frænum, and at other times within the scrotum. The disease undoubtedly originates in inflammation; but being once established, it may re-

main unaltered after all symptoms of active inflammation have subsided. If the tumor be very small, it gives the patient little or no inconvenience, but otherwise, it torments him by producing chordee, and by keeping up a constant gleety discharge from the urethra. For the most part the tumor, if left to itself, will disappear in the course of a few weeks or months; and I therefore recommend nothing to be done for it, in the first instance. If, however, it does not show any disposition to diminish, you may endeavour to reduce it by the external application of the unguentum hydrargyri with camphor, or by keeping the patient in bed, with a small gum catheter in the urethra and bladder. This plan may be pursued for a few days each time, and repeated at intervals until the tumor is nearly dispersed. The gum catheter should be of a small size: a large one will produce an effect exactly contrary to what you wish, irritating the gland, and exciting a fresh attack of inflammation in it. I have known the attempt made to destroy one of these enlarged follicles by means of the bougie armed with the nitrate of silver: but, in the cases to which I allude, the treatment seemed to be injurious rather than beneficial. It has often occurred to me that the tumour, when not of a very large size, and not very closely attached to the surrounding parts, might be dissected out without injury to the corpus spongiosum or urethra, but I have never yet performed such an operation. In some instances

suppuration takes place in one of these tumors, and an abscess bursts externally. The healing of the abscess is generally slow; and after it has healed, an induration remains, which, however, gradually disappears. In other cases it bursts internally, and the cavity of it is liable to become distended by a portion of the urine finding its way into it. Under these circumstances you may direct the patient to place his finger on the part when he makes water, so as to make a moderate pressure on it. Thus the urine will be prevented entering the abscess, which will at last, in all probability, heal. If, however, it should not heal, you may introduce a director into the urethra, and then make an incision in it so as to establish a free external opening, leading to the centre of the abscess. You may afterwards dress the part to the bottom with the Ung. Hydrarg. Nitrico-Oxydi, stimulating the surface at the same time with the nitrate of silver, and thus by degrees the abscess will be made to heal.

DISEASES OF THE FEMALE URETHRA.

Passing over those affections of the male urethra which are connected with syphilis and gonorrhœa, I shall draw your attention to the diseases of the female urethra. These are few and simple, and, as I have already had occasion

to observe, all that is to be said respecting them may be comprised in a very few words.

Stricture of the female urethra is very rare; nor have I ever seen it, except at, or immediately within, the external meatus. I have a preparation which affords an example of stricture in this situation. It was taken from the body of a woman who died under the following circumstances: — She was admitted into the hospital labouring under a very great difficulty of making water. The urine was voided almost in drops, with much effort and straining. On examination, I found the external orifice of the urethra so much contracted that it would scarcely admit a small probe. It was, however, dilated by means of bougies, and the patient voided her urine in a moderate stream. Some time afterwards she was seized with an attack of fever, which proved to be dependent on inflammation of the peritonæum covering the liver, unconnected with the stricture, and of this she died. You will observe that the stricture is quite at the extremity of the urethra, occupying about half an inch of the canal.

Sir Charles Clarke has described another disease of the female urethra, of which only a few examples have come under my own observation. It consists of a tumor, or excrescence, having its origin from the urethra immediately within the external meatus. The tumor projects externally; is of a soft texture; of a bright scarlet colour; possessed of exquisite sensibility; and

it varies in size from that of a large pin's head to the size of a horsebean. It may be removed by the probe-pointed scissors, the basis of it being afterwards destroyed with the caustic potass; or it may be removed by the application of a ligature. The first of these methods is that which I have myself adopted, and which my own experience in these cases would induce me to prefer. Cut off the tumor first as close to the base as possible; wait until the bleeding has ceased, and then apply the potassa fusa for a short time to the cut surface. On these, as on other occasions, where you employ this excellent and most useful caustic, you should take care that it is of the very best quality, and recently made; and after you have applied it, the parts in the neighbourhood should be bathed with vinegar, which will neutralise the caustic alkali, and prevent it acting where the action of it is not required. Sir Charles Clarke's experience on the subject is, however, greater than mine, and probably more deserving your attention; and he prefers the use of the ligature, which he recommends to be applied tight enough to cause the tumour gradually to drop off, but not tight enough to cut it through in the first instance.

LECTURE IV.

DISEASES OF THE BLADDER.

Irritable Bladder.

In the greater number of cases of disease of the bladder, the most marked symptom under which the patient labours is a too frequent inclination to void the urine. The bladder is irritable; and those who have not combined with the observation of symptoms the study of morbid anatomy, are apt to confound with each other diseases, which are essentially different, under the general appellation of irritable bladder. In the observations which I am about to make, however, I shall apply the term irritable bladder to those cases only in which the irritability is not the consequence either of inflammation or of organic disease.

If healthy urine escapes from the bladder, and comes in contact with other textures, the peritonæum, for example, or the cellular membrane, it acts on these parts as a violent stimulus, inducing inflammation, gangrene, and death: while to the bladder it is no stimulus at all; the

patient suffering no more inconvenience from it, than he would have suffered if the bladder had been distended with the same quantity of water. If, however, there be any derangement of the functions of the general system, or of the kidneys, in consequence of which the chemical qualities of the urine are altered, it then becomes a stimulus to the bladder itself; and the patient, under these circumstances, suffers inconvenience, and feels the desire to expel the contents of the bladder, when there is only a small quantity of urine collected in it. In some of these cases the urine contains an unusual quantity of lithate of ammonia, which is deposited, in cooling, mixed with other matter, in the form of a red or yellow uncrystallised sediment; or it may contain the pure lithic acid, shewing itself in the form of a red sand. In other cases the urine is alkaline, having the odour of ammonia, and depositing white crystals of the triple phosphate of ammonia and magnesia. It is right that I should notice these cases at present, though it be only in a brief manner. For further information respecting them, and the treatment which they require, I must refer you to some of my subsequent Lectures relating to calculous affections.

Irritability of the bladder is occasionally a symptom of disease in, or of disease affecting, the nervous system. An elderly man, for example, complains of frequent attacks of giddiness. Sometimes, in walking, his head turns round, so that he is in danger of falling; and this symptom,

probably, arises from an altered structure of the arteries of the brain, causing an imperfect state of the cerebral circulation. Not unfrequently this is attended with an irritable state of the bladder; and although the urine is of a healthy quality, and the bladder itself is free from disease, the patient is tormented by a constant micturition, voiding his urine without pain, but at short intervals, and in small quantity at a time. You can do little for the patient's relief in such a case as this, but it is important that you should understand its real nature, so that if you cannot effect a cure, you may avoid tormenting him with useless remedies.

Irritability of the bladder is sometimes the result of mere nervousness; of the same state of the bladder which, in some other individuals, occasions a constant winking of the eyes, or twitches of the muscles of other parts. The frequent expulsion of the urine, being once begun, is kept up by habit: the bladder becomes less capacious than it ought to be; and it is not until after a lapse of time, nor without some effort on the part of the patient, that it is restored to its natural condition.

There are others, who have a tendency to diabetes, and who, overlooking the too abundant secretion of urine, and observing only the too frequent inclination to expel it, consult you under the impression that they labour under a disease of the bladder, while the actual disease is in the kidneys, or rather in the general system.

Now, these things may appear too trivial to be worthy of being mentioned; but I have known them to be a source of error; and I am anxious that when you meet with these cases, you should not be perplexed in forming your diagnosis.

Paralysis of the Bladder.

Injuries and diseases of the brain and spinal marrow, which render the limbs paralytic, may render the bladder paralytic also. The bladder is not unfrequently affected in the same manner in cases of typhus fever, or where there is a great general excitement in consequence of a compound fracture, or other severe local injury, especially of the lower extremities.

Retention of urine from paralysis of the bladder is attended with symptoms which are, in many respects, different from those which occur where the retention arises from mechanical obstruction. The same diminution of nervous influence, which renders the bladder incapable of expelling the urine, renders it also insensible to its stimulus. Hence it is, that the accumulation of the urine in the bladder is productive of no actual suffering, and of comparatively little inconvenience. When a great degree of distension has taken place, the contents of the bladder begin to escape involuntarily; and this involuntary flow of urine continues so as to prevent further accumulation, but not so as to empty the bladder.

Being made acquainted with the circumstances which I have just mentioned, you will understand how it is that this kind of retention of urine is not unfrequently overlooked, especially in the cases of corpulent individuals, in whom the bladder may be distended to a considerable size, before it can be distinguished by the hand above the pubes.

In some instances, although the bladder has lost its contractile power, the patient is able, nevertheless, to get rid of a portion of its contents, in a stream, by his own natural efforts. This is accomplished by means of the action of the abdominal muscles, but not until the bladder has become enormously distended. Here the urine is expelled at short intervals, slowly, and in small quantity at a time. The patient believes the bladder to be empty, as he probably voids as many ounces of urine as are usually voided in twenty-four hours; and he is surprised to find, on the introduction of the catheter, that it draws off three or four pints, or even a larger quantity. Where this state of things has existed for a considerable time, if the patient dies, and you have the opportunity of instituting a *post-mortem* examination, you find the bladder very much dilated, the mucous membrane of a pale colour, and the muscular tunic much attenuated.

Where the bladder is affected with paralysis, the patient is to be relieved by means of the catheter: and this is easily accomplished; there being no mechanical impediment to the intro-

duction of the instrument. The operation must be repeated at stated intervals, at the same time that you attempt, by suitable remedies, to remove the cause of the paralysis, whatever it may be.

But it may be reasonable to enquire what will happen if the catheter be not employed. I have known such a retention of urine to exist, some urine escaping, but the bladder remaining distended, without the real nature of the case having been understood, for a great length of time, for many months, or even for one or two years. The same overloaded state of the bladder is a still more frequent consequence of the chronic enlargement of the prostate gland to which elderly persons are liable, as I shall explain to you hereafter. From whichever of these causes it arises, it produces the same effects. The kidneys become diseased; they secrete at first albuminous, and afterwards purulent urine; and other changes are produced in these organs which I need not describe at present, as they will be fully explained in the next Lecture.

Paralysis of the bladder is usually the result of some disease or injury, which affects other muscles as well as that of the bladder. Occasionally, however, it occurs without this complication; the bladder, and (as far as we can see) the bladder only, being deprived of its power of action. A gentleman, a lawyer by profession, of sedentary habits, and of what is commonly called a nervous disposition, observed that he

had not the usual desire to void his urine, and that when he did void it, it was in a very slow stream, and in small quantity. On the following day he voided none at all, but he had, at the same time, no inclination to do so, and, therefore, did not suffer. Another day arrived, and, being still in the same condition, he thought it prudent to consult a surgeon; not because he experienced either pain or inconvenience, but because he knew, as he expressed it, that all could not be right. The surgeon introduced a catheter, which entered the bladder without the smallest difficulty, and drew off a large wash-hand-basinful of urine. The urine soon became again collected in the bladder, and the catheter was again had recourse to. The operation was repeated night and morning for a few days, at the end of which time the patient regained the power of making water, and was soon able to evacuate the contents of his bladder as usual. Some time afterwards he had another similar attack, from which he recovered more slowly than from the former one.

The paralytic affection of the bladder, which occurs in hysterical females, is of a peculiar kind, and deserves a separate consideration. It appears to me that the symptoms are to be traced to a still higher source than in ordinary cases of paralysis; that, in the first instance, it is not that the nerves are rendered incapable of conveying the stimulus of volition, but that the effort of volition is itself wanting; and this cor-

responds with what is observed in cases of loss of voice, and in many other diseases connected with hysteria. As the distension of the bladder increases, the patient begins to be uneasy, and at last suffers actual pain; and as soon as this happens, the volition is exercised as usual, and the bladder begins to expel its contents.

Thus, if the bladder be not relieved artificially, by the introduction of the catheter, the hysterical retention of urine is usually of short duration. If, however, the catheter be had recourse to, the natural cure is prevented, and the existence of the disease may be prolonged for an indefinite period of time — for weeks, or even for months. The general rule to be observed in the treatment of these cases is to interfere but little. You may administer an active aperient, or an assafœtida enema, or you may give assafœtida by the mouth, but you should avoid using the catheter. This general rule, however, is not without its exceptions. In a few of these cases, where the bladder has been very much distended, in consequence of this over-distension it loses its power of contraction, and, even though the patient strains to make water, no urine flows. Under these circumstances it is evident that artificial relief is necessary; and if it be not afforded, more than simple inconvenience may be the result. A young woman was admitted into St. George's Hospital, in November, 1814, labouring under a train of symptoms which I believe to have been connected with the same

condition of the nervous system as that which produces the phenomena of hysteria. I should be wandering from my subject, if I were to relate to you all the circumstances of this interesting and important case. It is sufficient for our present purpose that you should be informed that one of the symptoms was a retention of urine, which had been long neglected, and which existed to such an extent that forty ounces of urine were drawn off by the catheter; and that the patient ultimately died. In my notes, I find the following account of the appearances which the bladder presented in the *post-mortem* examination:—"It was of a very large size, as if it had been for a long time unusually dilated. It was throughout of a dark colour, almost black. There were only some slight vestiges of its natural structure left; the muscular fibres being very much wasted, and the internal membrane presenting the appearance of a very thin film, which was readily separated from the parts below. The dark colour of the bladder did not seem to arise from mortification, since there was neither fœtor, nor any other mark of putrefaction." The state of the bladder was, indeed, very peculiar; not resembling any thing which has fallen under my observation either before or since.

Inflammation of the Bladder.

You will find in practice that acute inflammation of the bladder is of much less common occurrence than you would suppose it to be, from what is said on the subject by nosological writers. Cases of retention of urine, and cases of inflammation of the prostate gland, are not unfrequently mistaken for it by persons who are not very conversant with the diseases of the urinary organs.

Acute inflammation of the bladder does, however, occur sometimes. You have especially the opportunity of seeing it in cases of gonorrhœa. Where there is a sudden suppression of the discharge from the urethra, the metastasis takes place, sometimes to the testicle, sometimes to the prostate gland; at other times, but less frequently, to the mucous membrane of the bladder. The patient has a frequent desire to void his urine, with a sensation as if there were urine in the bladder, when there is really no urine in it; and he strains to make water, with the bladder empty. There is pain referred to the region of the pubes and perineum. The urine deposits a sediment, which is of a different character in different cases, as I shall explain hereafter. The pulse is frequent, the tongue furred, and there is a good deal of constitutional excitement. These symptoms may continue for several days; and in

cases of gonorrhœa they do not usually subside until the purulent discharge from the urethra is restored.

The disease is to be combated by taking blood from the arm, or from the loins by cupping, or from the lower part of the abdomen by leeches. The patient should be confined to bed, and the horizontal posture. His bowels should be kept open by occasional doses of castor oil. Opium may be administered with advantage, especially in the form of clysters. Sometimes the urine retains its acid quality, turning the blue litmus paper red; and the sediment which it deposits is of a yellowish colour, having no adhesive quality, and bearing some degree of resemblance to pus; and in these cases, if I am not much mistaken, the patient will derive benefit from the use of mercury, two grains of calomel, and half a grain of opium, being administered twice or three times daily. In other cases the urine is alkaline, turning the reddened litmus paper blue, and depositing a small quantity of tenacious adhesive mucus of a brownish colour; and, under these circumstances, I have known much good to arise from the use of the vinum colchici, thirty drops being given three times daily for three or four successive days.

Chronic inflammation of the bladder occurs very frequently as a secondary disease, depending on long continued stricture of the urethra, disease of the prostate gland, or stone in the bladder. Women are also liable to it, in whom there

exists an ulcerated communication between the bladder and vagina. As a primary affection it is comparatively rare. However, it occurs as such sometimes; and I have seen a few patients in whom it had existed for a considerable length of time, and could not be traced to any other disease.

I shall describe to you, first, the appearance which the diseased parts exhibit on dissection; secondly, the symptoms which the disease produces; and, lastly, the treatment which it requires.

The mucous membrane is of a dark red colour, in consequence of its vessels being seen ramifying on its surface, injected with their own blood. As the disease proceeds, the discolouration becomes greater, until, at last, the mucous membrane appears almost black from the turgid state of the vessels; at the same time that it is somewhat thickened and pulpy to the touch. The inflammation extends up the membrane of the ureters; which, in their turn, assume much the same appearance with the bladder itself. The pelvis of each kidney, and the processes of the pelvis, or infundibula, become inflamed also: and these, as well as the ureters, are generally dilated, so as to be more capacious than natural. This dilatation is greatest where there has been a long continued difficulty in expelling the urine from the bladder; but it exists in other cases also, though in a less degree. In the advanced stage of the disease the inflammation is found to have extended to the glandular structure of the

kidneys; and these organs become not only more vascular than natural, but enlarged in size, and of a soft consistence, even approaching to that of a medullary tumour. Collections of muco-purulent fluid, tinged brown with grumous blood, and offensive to the smell, are sometimes found in the dilated infundibula: at other times there are distinct abscesses in the glandular structure. In cases where the disease is still farther advanced before the patient dies, we find that the inflammation has extended to the muscular tunic of the bladder, and to the loose cellular membrane by which the bladder is surrounded. Coagulated albumen is deposited in the cellular texture; not unfrequently, small putrid abscesses are formed in it; and sometimes it is found after death in a state of slough, or approaching to it. Occasionally, but rarely, ulceration takes place on the inner surface of the bladder, and sometimes to a very great extent. A patient, about fifty years of age, died in our hospital, labouring under the symptoms which I am about to describe. On examining the body, the mucous membrane was found destroyed everywhere, except a very small portion near the neck of the bladder. The muscular fibres were as distinctly exposed, as they could have been by the most careful dissection. The prostate gland in this case was slightly enlarged; the membrane of the ureters and pelves of the kidneys were much inflamed, and the ureters were dilated. I remember a preparation, exhibiting nearly the

same appearances, in Dr. William Hunter's Museum, which was formerly in Windmill Street, but which is now in Glasgow.

As chrónic inflammation of the bladder is, in the majority of cases, not a primary but a secondary affection, the symptoms of it are generally blended with those of another disease, as of stone in the bladder in one case; of stricture in the urethra, or enlargement of the prostate, in another case. I shall endeavour to describe the symptoms as nearly as I can, distinct from those of the diseases which it accompanies, such as you find them to be in those cases, in which the inflammation of the bladder is the only existing malady.

The patient has frequent desire to void his urine, and the urine deposits, as it cools, a thick adhesive mucus, which clings to the bottom of the vessel. This mucus is of a greyish colour streaked with white, and sometimes tinged with blood. There is usually a slight pain previous to making water, and also while the urine flows. These symptoms may continue for a great length of time without becoming very urgent. However, they gradually increase until the irritation of the bladder becomes excessive, and the quantity of mucus deposited is so great, as in some cases to be nearly equal to the urine itself. In this last respect, however, there is a great difference in different cases. The urine ultimately is voided of a brownish hue, and of a most offensive ammoniacal odour. The patient

has shiverings; his pulse becomes irregular and intermitting; his tongue brown, he sinks, and dies. In the case which I mentioned, in which the bladder was extensively ulcerated, there was excruciating pain referred to the perineum and urethra, especially after making water; and the introduction of a sound into the bladder occasioned excessive torment. The symptoms which existed in the patient whose ulcerated bladder is preserved in Dr. William Hunter's Museum are thus described in Dr. Hunter's Catalogue: — "Great pain and scalding in voiding the urine, a discharge of pus, and occasionally of blood."

The mucus which is deposited by the urine in these cases deserves our especial notice. It is thick and viscid, clinging to the bottom of the chamber pot, and hanging down in the form of long ropes when you attempt to pour it from one vessel to another. It is highly alkaline, turning the turmeric paper immediately brown. When small in quantity, although the mucus is alkaline, the urine often remains acid, as has been observed by Dr. Prout; but when the quantity of mucus is large, it imparts its alkaline quality to the whole of the urine, which, under these circumstances, is liable to deposit a calculous substance, composed of phosphate of lime, in small masses, of the consistence of recently made mortar. It is the formation of this peculiar mucus which led the old physicians and surgeons to apply to this disease the name of *catarrhus vesicæ*.

In the treatment of chronic inflammation of

the bladder, you are to consider whether it be a primary or secondary affection; and if the latter, the first thing to be done is, that you should remove or palliate the original complaint. If there be a stricture, you are to dilate it: if there be a stone in the bladder, you will in vain endeavour to remove the inflammation, without removing the stone, which has produced it: if there be a disease in the prostate gland, you are to resort to the plan of treatment which I shall describe to you in a future Lecture.

But even in these cases something may be done by other means towards relieving the inflammation of the bladder; and where the inflammation of the bladder is the original disease, of course these other means are all on which you are to depend.

Let the patient remain as much as possible in the horizontal posture. When he sits or stands, there is the weight of the whole column of blood, from the head to the pelvis, pressing on the vessels of the bladder; and these vessels become distended, which are comparatively empty when he lies down. The horizontal position is as important in diseases of the bladder as it is in diseases of the uterus; as important as an elevated posture and a high pillow are in cases of determination of blood to the head; and its importance rests on precisely the same principle.

Opium agrees remarkably well with patients who labour under chronic inflammation of the bladder. It may be administered in the form of

an enema at bedtime; and other sedatives, as the extract of hyoscyamus, or lettuce, or poppies, may be administered besides, if necessary. The bowels should be kept in an open state, but no violent or drastic purgatives should be exhibited. Mercurial remedies, whether given in the form of alteratives, or in larger doses so as to affect the constitution, are certainly not beneficial, and are often injurious.

In some instances, where the digestion is impaired, small doses of alkalies, combined with light bitters, may be exhibited with advantage; but the extensive use of alkalies is prejudicial, causing the urine to become more alkaline, and the phosphatic salts to be deposited in larger quantities than before.

The uva ursi has the reputation of being useful in some cases of chronic disease of the bladder, and in this among the rest. I must say, however, that I have been disappointed in the use of the uva ursi, and that I have not seen those advantages produced by it, which the general reputation of the medicine had led me to expect. I have seen much more good done by a very old medicine, which has been long ignominiously, but unjustly, expelled from the Pharmacopœia of the College of Physicians, namely, the root of the pareira brava; and with regard to this, I am satisfied that it has a great influence over the disease which is now under our consideration, lessening very materially the secretion of the ropy mucus, which is in itself a very great evil,

and, I believe, diminishing the inflammation and irritability of the bladder also. It may be exhibited in the following manner: — Take half an ounce of the root of the pareira brava, add three pints of water, let it simmer gently, near the fire, until reduced to one pint. The patient is to drink from eight to twelve ounces of this decoction daily. You may add to it moderate doses of the tincture of hyoscyamus; and in those cases in which there is a deposit of the phosphates, you may also add some of the muriatic, or nitric acid. Very small doses of turpentine are sometimes beneficial in these cases. You may begin with one or two grains of Chios turpentine twice daily, giving a somewhat larger quantity afterwards. I have often known the symptoms to be much alleviated under the use of the cubebs pepper; but it must be given only in small quantities, fifteen or twenty grains, for example, three times daily. When given in large doses, I believe it to be actually injurious. I was consulted by a gentleman who laboured under chronic inflammation of the bladder, and I prescribed him fifteen grains of the powdered cubebs to be taken every eight hours. He was very much relieved, so much so, that he began to look forward to his recovery. Being anxious to expedite his cure, of his own accord, and without my knowledge, he took the cubebs in larger (I believe in dram) doses. This was followed not by a diminution, but by an aggravation of all his symptoms. The irritation

of the bladder was much increased, the mucus was secreted in a much larger quantity than before, and ultimately the patient died; his death being, I will not say occasioned, but apparently very much hastened, by his imprudence in overdosing himself with the cubebs.

The decoction of the buchu (diosma crenata), which of late years has been introduced as a cure for what has been called irritable bladder, is sometimes useful in these cases also.

Among the remedies to be employed in cases of chronic inflammation of the bladder, I have said nothing of the abstraction of blood. Yet I have resorted to blood-letting in many instances; generally by means of the application of cupping glasses to the loins. I will not say that it has never been beneficial, but it is my duty to say also, that I have much more frequently found it to be injurious. However strange it may appear, and however contrary to the principles on which the treatment of inflammatory diseases is generally to be conducted, I am satisfied that in those cases of inflammation of the bladder in which the mucous membrane secretes a considerable quantity of thick, tenacious, ropy mucus falling to the bottom of the urine, the rule of practice should be, not to take away blood; and that this rule admits of very few exceptions. In fact, this species of vesical inflammation is, in the great majority of cases, combined, in some way or another, with great debility of the general system, and the patient re-

quires (for the most part) that his bodily powers should be supported, rather than that any demand should be made upon them. I may refer you to my Lectures on Calculous Disorders for some observations in further illustration of this subject.

In speaking of inflammation of the bladder, I have considered it as being either of the acute or chronic kind; not only in compliance with general custom, but because I could not otherwise so conveniently express all that is required to be said on the subject. At the same time it is right for you to bear in mind, not only on this but also on other occasions, that, however useful it may be to make it, this distinction is really artificial. The boundaries of acute and chronic inflammation are not well defined. There are numerous cases in which we must hesitate to determine whether they may with most propriety be referred to the one class or to the other; and there are other cases which, while they exhibit at one period all the marks of acute inflammation, exhibit, at another period, those of chronic inflammation with equal distinctness.

Tumors and Excrescences of the Bladder.

Morbid growths occasionally take place from the inner surface of the bladder, constituting the most formidable of all the diseases to which this organ is liable.

These morbid growths are of various kinds:

the most common have the structure of fungus hæmatodes; but sometimes they resemble scirrhus. In Dr. W. Hunter's Museum there is a preparation of a bladder, the inner membrane of which is, in several parts, elongated into laminæ or processes, each about one quarter of an inch in length. I have seen one case in which a fungus projected into the cavity of the bladder, having somewhat of a fibrous structure, and a good deal resembling in appearance the vessels of the placenta when unravelled.

I do not undertake to point out to you the peculiar symptoms by which these different kinds of excrescence are to be distinguished from each other in the living person; and as such cases are all equally beyond the control of art, the distinguishing them from each other is of little real importance.

The patient in these cases has a too frequent desire to void his urine; the urine is, more or less, and sometimes constantly, tinged with blood; and flakes of coagulated lymph, and not unfrequently what appear to be small sloughs, are seen floating in it. Beyond these, the symptoms vary a good deal according to the situation of the tumor in the bladder. A patient who had long had difficulty of making water was admitted into our hospital with a complete retention of urine. I introduced a catheter, which, however, drew off no urine. I, therefore, punctured the bladder above the pubes, where it formed a very prominent tumor. A canula was

allowed to remain in the wound, through which the urine continued to flow. The patient, however, survived the operation not many days; and on examining the body after death, a large medullary or fungous tumor was discovered, growing from the inner surface of the bladder, and completely obstructing the inner orifice of the urethra.

In another case the patient complained of frequent desire to void his urine, but never had any difficulty in voiding it; there was blood in the urine, and pain referred to the urethra and glans after the urine had flowed. But the most marked symptoms under which he laboured were a constant wearing pain in the loins and in the lower part of the abdomen above the pubes. He thought that this last symptom was relieved by pressure, and was accustomed to walk about with his hand constantly applied to the part to which he referred the pain. These symptoms continued and increased for seven or eight years, at the end of which time the patient died. On examining the body after death, the bladder was found much contracted, and there was a tumor growing from the mucous membrane at the fundus, and projecting into its cavity. This tumor, at its basis, had the structure of scirrhus, but where it projected into the bladder it had the structure of fungus hæmatodes. The fundus of the bladder had contracted adhesions to the sigmoid plexure of the colon, and a portion of the tumor projected into the cavity of that

part of the great intestine. The ureters were dilated each to the size of the small intestine, and the pelves of the kidneys were much dilated also, forming considerable sacs or pouches distended with urine.

I attended a gentleman who laboured under symptoms which seemed to indicate the existence of a fungous tumor of the bladder; at last the urine flowed from him constantly and involuntarily, and he suffered unremitting pain in the perineum, urethra, and pubes. A large tumor now shewed itself in one groin, which increased rapidly up to the day of his death. On examining the body there were found scarcely any remains of the natural structure of the bladder: nearly the whole of it was converted into a fungous tumor, occupying the cavity of the pelvis, and extending laterally so as to present itself in the groin.

These cases admit of no relief beyond that which is to be derived from the exhibition of opium, and rest in the horizontal position. There is nothing then to be said respecting their treatment: however, it is of some consequence that we should be able to distinguish them from other cases in which surgery may be useful. The principal diagnostic marks then are these. There is pain after making water, and blood in the urine: so far the symptoms resemble those of stone in the bladder. But the seat of the pain is more extensive than in cases of calculus. We observe flakes of lymph and fragments of slough

floating in the urine; the urine is generally offensive to the smell; and when a sound is introduced into the bladder it often strikes against a solid substance, which gives to the fingers a peculiar sensation entirely different from that given by a calculus.

LECTURE V.

DISEASES OF THE PROSTATE GLAND.

Inflammation of the Prostate Gland.

Persons who are advanced in life are liable to a chronic enlargement of the prostate gland, producing, in many instances, a train of distressing and even dangerous symptoms, which I shall describe hereafter. But this organ is not altogether exempt from disease in earlier life. In cases of gonorrhœa it not unfrequently happens that the discharge from the urethra suddenly ceases, and the inflammation, leaving the part originally affected, attacks the prostate. The peculiar symptoms which occur in the cases, to which I allude, cannot well be explained in any other way, and it may be observed that they are never met with except in the male sex.

The patient observes that the gonorrhœal discharge stains his linen much less than it did before, or that it ceases altogether; and he experiences, at the same time, a frequent inclination

to void his urine, and a difficulty in voiding it. He complains of uneasiness and pain referred to the neck of the bladder, and extending forward in the course of the perineum and urethra, and this pain is aggravated on each attempt to make water. In some cases there is a complete retention of urine. The impulse to make water is then violent and irresistible; and it is attended with more suffering than in ordinary cases of retention, on account of the urine, which is accumulated in the bladder, being pressed with force against the inflamed and tender prostate. There is a sense of fulness in the perineum and rectum, and the prostate is manifestly tender when examined from the rectum with the finger.

Not uncommonly suppuration takes place, and an abscess forms, of which the symptoms, in the first instance, are generally obscure. As the abscess advances, the perineum becomes tender, and there is a perceptible though slight tumefaction and hardness in some one part of it. The abscess, if left to take its own course, sometimes bursts internally — that is, into the urethra; more frequently it makes its way through the fascia, cellular membrane, and muscles of the perineum, and bursts through the external skin.

These local changes are attended with no small degree of disturbance of the general system. The pulse is frequent; the skin hot; the tongue furred; and the formation of matter is often indicated by rigors.

The first object of the surgeon should be to

prevent suppuration. The patient should remain in bed, in the horizontal posture. Blood is to be taken from the loins, or perineum, by cupping; and the cupping should be repeated or not according to circumstances. Cupping on the perineum, however, can be performed only by a dexterous cupper; and where such a one cannot be procured, leeches must be applied instead. The bowels should be thoroughly opened, by the exhibition of calomel and a senna draught; and afterwards an enema should be administered, of two ounces of thin starch and half a drachm or a drachm of laudanum. This will require to be repeated probably every night, or even oftener, and a gentle aperient may be given in the intervals. If there be a retention of urine, the gum catheter, without a wire or stilet, may, in almost every case, be readily passed into the bladder. It is better to use a very small catheter, and to introduce it again, whenever it is necessary to do so, than to leave it constantly in the urethra and bladder. If there be reason to believe that abscess is formed, you should endeavour to procure an external discharge for the matter, in order to prevent it bursting into the urethra. If such symptoms as I have described exist, and go on for some time increasing, and you discover a fulness and tenderness of the perineum, do not wait for any more certain indication of the abscess; but introduce a lancet, in the direction indicated by the tenderness and swelling. It will often be necessary to introduce

the lancet quite up to the shoulders, or even to the handle, before you reach the abscess. But you may do this fearlessly. There is no danger of any ill consequences from such a puncture. If there be abscess, you will by this proceeding immediately relieve the distress which the patient suffers, at the same time that you prevent further mischief. If, on the other hand, there be no abscess, the puncture does not make the condition of the patient worse than it was before. Indeed, partly from the loss of blood, partly by removing the tension of the soft parts of the perineum, the puncture is generally useful to the patient, even when it does not answer the principal purpose of allowing the escape of matter.

But abscess of the prostate gland may take place in young men under other circumstances, besides those which I have just mentioned.

A man about thirty years of age was received into the hospital, voiding his urine every twenty or thirty minutes, and complaining of an aching pain in the loins; but of no pain any where else. The urine deposited a small quantity of yellow puriform sediment. He said that the symptoms had begun two years ago, and that in the commencement of the disease the urine had been tinged with blood. I prescribed the use of an opiate clyster every night; and under this treatment the inclination to make water became less frequent.

About a month after his admission into the hospital, the man was suddenly seized with symp-

toms of apoplexy, of which he died in the course of a few hours. In the examination of the body, we discovered an abscess of the size of a large walnut, occupying the posterior part of the prostate gland, and extending into the space between the bladder and vasa deferentia behind the neck of the bladder. On slitting open that portion of the urethra which passes through the prostate, a large irregular ulcerated orifice was discovered behind the verumontanum, through which the probe passed at once into the cavity of the abscess.

I had the opportunity of observing the same morbid appearances in the *post mortem* examination of a patient who died under the care of Dr. Prout and myself, and who had long laboured under symptoms of disease at the neck of the bladder. I conclude that in the following case, also, the seat of the abscess was in the prostate gland.

A gentleman, about thirty years of age, consulted me, complaining that the urine flowed slowly, and with difficulty. I introduced a gum catheter, and found a considerable quantity of urine left in the bladder, after he had voided what he could by his own efforts. There was no stricture of the urethra, and the use of the instrument did not relieve the difficulty of making water, so that it was necessary to introduce it two or three times daily. When this plan had been persevered in three or four days, there took place one evening a severe attack of shivering.

The next day it was discovered that the urine deposited a considerable quantity of pus. The patient could now make water and empty his bladder without the assistance of the catheter: however, he was directed not to do so, but to use the catheter for himself every six or eight hours. The urine continued to deposit the same purulent sediment, but the quantity of it gradually diminished, and in the course of two or three weeks it disappeared entirely; and no other symptoms being left, the further use of the catheter was not considered necessary. I have seen this gentleman several times since, on other occasions, and, as far as I know, he has never had any return of the complaint.

In the case which I have mentioned as having been attended by Dr. Prout and myself, in addition to the abscess at the neck of the bladder, there were abscesses and extensive disorganisation of the kidneys. I believe this combination of disease to be by no means uncommon. We cannot well doubt its existence in the following case, although the fact was not absolutely proved by dissection.

A young man had symptoms which led me to suspect the existence of abscess of the prostate. Under these circumstances, he was seized with a rigor, pain in the loins, extending downwards in the course of the ureter; in short, with symptoms like those produced by the passage of a calculus from the kidney into the bladder. These

symptoms suddenly ceased, and he voided not a calculus, but a mass of lymph and pus, and some blood, which came away with the urine. I now was led to believe that I had been mistaken in my notion as to the original seat of the disease, and to suspect that the neck of the bladder had been affected only from sympathy with the kidney; but soon afterwards another abscess presented itself in the perineum, which I opened with a lancet, proving that my original opinion had not been incorrect. This gentleman went into the country, and soon afterwards died labouring under a severe diarrhœa. Unfortunately, the body was not examined after death.

When a patient labours under such symptoms as would lead you to believe that an abscess has formed in the prostate, communicating with the neck of the bladder, you should direct him not only to be as quiet as possible, but to remain altogether in the horizontal posture. You should instruct him in the use of the gum catheter, and he should introduce it for himself whenever he has the desire to void his urine, so that he may always make water by means of the catheter, and not by his own efforts. In some instances I have caused the gum catheter to be constantly retained in the urethra and bladder, until the abscess has healed: but this plan not unfrequently irritates the neck of the bladder; and the occasional introduction of the catheter is, for the most part, to be preferred. In some

instances, even this excites irritation, and the catheter must be omitted altogether.

Besides this, you must attend to the state of the patient's general health. There is usually in these cases a weak state of the constitution; the patient is of what is called a scrophulous habit; and the healing of the abscess may be promoted by the exhibition of the sulphate of quinine, or steel, or other tonics. I have been led to believe, in some cases, that good has been derived from the internal use of the Cubebs pepper, 20 or 30 grains of which may be administered three times daily. It seems to act as a gentle stimulus to these parts, and to operate on the disease much in the same way as Ward's paste operates on abscesses, and fistulæ, and ulcers, of the rectum. The great majority of patients recover under this plan of treatment; but there are others who at last fall victims to the complaint — ultimately dying, as I have already explained, not so much in consequence of the disease at the neck of the bladder, as of a corresponding disease taking place in the kidney.

Chronic Enlargement of the Prostate Gland.

I have said that the prostate gland is more frequently the seat of disease in old age than it is in youth.

At different periods of human life, different changes take place in the condition of the organs

of which the system is composed; and none of these are more remarkable than those which shew that the individual has entered on that downward course, which is to end in his dissolution.

When the hair becomes grey and scanty, when specks of earthy matter begin to be deposited in the tunics of the arteries, and when a white zone is formed at the margin of the cornea, at this same period the prostate gland usually, I might perhaps say invariably, becomes increased in size. This change in the condition of the prostate takes place slowly, and at first imperceptibly, and the term *chronic* enlargement is not improperly employed to distinguish it from the inflammatory attacks to which the prostate is liable in earlier life.

In the *post mortem* examination of persons, who die labouring under this disease, we find the prostate sometimes enlarged only in a slight degree; but frequently it is two or three times, and occasionally even ten or fifteen times, its natural size. We also find more or less alteration in its texture. For the most part it is harder than natural; but, in a few instances, it is the reverse. In some instances, the enlarged prostate retains nearly its natural form; and, under these circumstances, if you lay open the cavity of the bladder, you find the existence of the disease marked only by the appearance of an uniform circular projection surrounding the internal orifice of the urethra. More frequently, however, the form of the prostate is altered, and it no

longer presents the appearance of a chesnut placed at the neck of the bladder, and perforated by the urethra. Posteriorly the lateral portions of the prostate are found extending on the outside of the vesiculæ seminales, between the bladder and the rectum. That part of the prostate, also, which is situated between the *vasa deferentia* and the neck of the bladder, and to which Sir Everard Home has given the name of the third lobe, becomes enlarged also, forming a tumor projecting forward into the cavity of the bladder, behind the inner orifice of the urethra. This tumor varies in size from that of a horse-bean to that of an orange. When small, it is of a conical form, with the apex of the cone projecting into the bladder, and the basis being continued into the rest of the prostate. When large, the basis is often the narrowest part, and it swells out so as to have a pyriform figure towards the bladder. In some instances, by the side of that which I have just mentioned, there is another tumor, formed by one of the lateral portions, also projecting into the bladder.

The canal of the urethra, where it passes through the enlarged prostate, is generally flattened; and when the latter is divided transversely, the urethra appears like a slit, rather than like a cylindrical canal. Not unfrequently the enlargement of the prostate so alters the form of the urethra, that instead of pursuing a straight course through the gland, it is inclined first to one side and then to the other. You would ex-

pect the urethra to be rendered narrower in consequence of the increased bulk of the parts by which it is surrounded; and so it is in many instances: in others, however, it is actually wider, being dilated into a kind of sinus, where it lies in the centre of the prostate. I have known such a sinus to exist, of a sufficient size to contain two or three ounces of fluid. In addition to these changes, the natural curve of the urethra, as it approaches the bladder, is increased. It forms a portion of a smaller circle. It also becomes elongated, so that the distance between the orifice on the glans penis and the cavity of the bladder is greater than natural. This is the necessary consequence of the increased size of the prostate; and in this manner as much as two or three inches are sometimes added to the length of the urethra.

Malignant diseases of the prostate are of very rare occurrence, and it is certainly a great mistake to apply the term scirrhus to the cases which I have just endeavoured to describe. The chronic enlargement of the prostate may be said to be a disease of a peculiar kind, having no exact resemblance to what we meet with in any other organ. It may, however, in some respects, be compared to the chronic enlargement of the thyroid gland, known by the name of bronchocele. Like the latter, it is generally slow in its progress; and frequently, after having reached a certain point, if proper treatment be employed, it remains almost stationary for many years: it

has but little disposition to terminate in ulceration or abscess; and the symptoms, to which it gives rise, are, with a few exceptions, to be referred to the influence which the disease exercises over the functions of the parts in the neighbourhood.

Symptoms of the Chronic Enlargement of the Prostate Gland.

There are but few individuals who, in the latter period of life, do not suffer some degree of inconvenience in consequence of the enlarged state of the prostate. The bladder becomes irritable, and there is a more frequent inclination to void the urine than under ordinary circumstances: at the same time the urine is ejected in a slower stream. These symptoms come on very gradually, and for a considerable time attract but little of the patient's attention. A sudden and violent aggravation of them may, however, take place at any period. In consequence of exposure to damp and cold, or of some irregularity as to diet, and, very frequently, as a result of venereal excitement at a time when the sexual powers are beginning to decline, there is an increased determination of blood to the prostate, which was before enlarged, causing it to become still further increased in size. The expulsion of the urine then becomes more difficult than it was before,

and soon is prevented altogether. There is, in short, a complete retention of urine.

The symptoms of retention of urine, from enlargement of the prostate, are not very different from those, which occur where the retention is the consequence of stricture, but the termination is different. I never saw, nor have I heard of, a case in which, under these circumstances, the bladder had given way, as sometimes happens where there is a retention from stricture; and it is evident that the urethra itself cannot be ruptured, as the urine does not even enter it, the obstruction being altogether posterior to it. But the patient cannot survive a retention of urine from this cause, any more than he can survive a retention of urine from other causes, beyond a certain period of time. The powers of his nervous system become exhausted: there is a cessation of local suffering; the tongue becomes dry and black, coma supervenes, and these symptoms terminate in death. Mr. Travers has informed me of two cases of long continued retention in consequence of enlargement of the prostrate, which fell under his observation, in each of which the mucous membrane was converted into a slough, and was found, after death, lying loose in the cavity of the bladder.

The prostate being once enlarged, it is evident that a very small addition to its bulk may be sufficient, under certain circumstances, to prevent the expulsion of urine from the bladder.

Hence it is, that no individual who labours under this disease can be regarded as being at any time free from the danger of a complete retention of urine. This, however, where surgical assistance can be procured, and proper treatment is employed, is for the most part only a passing evil. The patient is relieved by the judicious administration of art, and a considerable time may elapse before he experiences another similar attack.

But he is liable to other evils, which, although less formidable in appearance, and more insidious and gradual in their progress, lead, if neglected, to a no less fatal result. As the disease advances, the urine is ejected in so slow a stream that it drops perpendicularly downwards from the orifice of the urethra. It is voided at short intervals — every hour, or half hour, or every twenty minutes; or, perhaps, it dribbles away involuntarily. This latter symptom occurs especially when the patient is in bed, and is a source of great anxiety and distress. At the same time a slight degree of pain is experienced in the course of the urethra, and in the glans penis. At first the urine is clear, in no way different from that of a healthy person; then a few small threads or flocculi are seen floating in it; and afterwards it becomes slightly turbid and opaque. If, under these circumstances, you introduce the catheter into the bladder, you find a simple explanation of all these symptoms. Although the patient is continually voiding his urine, and gets rid of the

usual quantity in the twenty-four hours, his bladder is never empty. A certain portion of urine is always stagnant in it, the quantity of the residuum varying, in different cases, from one or two ounces, to one or two pints, or even more.

Now, I do not mean to assert that all persons, in whom the prostate is enlarged, lose the power of emptying the bladder, but I certainly believe that this happens in the greater number of instances: and you will soon learn how important is the knowledge of this fact, whether it be viewed in connection with pathological science or with practical surgery.

When the prostate gland is much enlarged, the tumor, projecting into the bladder, irritates the mucous membrane, which becomes in consequence affected with chronic inflammation. The same effect is produced, and to a still greater extent, by the constantly distended state of the bladder. The inflamed surface secretes a thick, tenacious mucus, having an offensive ammoniacal odour; which is in itself a source of irritation, aggravating the inflammation in which it had its origin. I have already explained to you what are the symptoms and the consequences of chronic inflammation of the mucous membrane of the bladder, and you will easily understand how much this complication must add to the patient's sufferings and danger. Chronic inflammation of the mucous membrane of the bladder is, indeed, one of the most frequent causes of death in neglected cases of enlargement of the

prostate; and where it does not operate directly, it frequently operates indirectly, so as to produce a fatal result. Small earthy deposits are formed in the alkaline mucus; many of which, instead of being expelled by the urethra, fall to the bottom of the residuary urine: these, increasing in size, and ultimately becoming cemented together, lay the certain foundation of a calculus in the bladder. I shall give you a more particular history of vesical calculi produced under these peculiar circumstances, in a future Lecture.

In all cases of enlarged prostate, in which the disease is allowed to take its own course, the muscular tunic of the bladder becomes increased in thickness and strength. The reason of this is obvious. The bladder has been called on to make unusual efforts; and all muscles, under these circumstances, acquire an increase of size. The mucous membrane frequently becomes protruded through the triangular spaces between the muscular fibres, forming pouches, or cysts, similar to those which I have already mentioned as occurring in neglected cases of stricture of the urethra. These cysts are generally small, but occasionally they attain a large size; and it is remarkable that they sometimes contain what appears to be pure pus, while the bladder, with which they communicate, contains only urine. An old gentleman consulted me, labouring under disease of the prostate gland. He had a frequent inclination to void his urine; and on introducing

the catheter, immediately after he had voided it, about three or four ounces of urine were found to have been left in the bladder. But what he chiefly complained of was an uneasy sensation in the rectum. He gave it the name of a *worming* sensation, and said it was as if a worm was crawling between the bowel and the bladder. One day, after drawing off the usual quantity of nearly clear urine, on introducing the catheter a little further, to my surprise, half a pint of pus come away. The same thing occurred two or three times afterwards. At first I was led to believe that the catheter had entered the cavity of a common abscess. But it was not long before I had the opportunity of ascertaining the real nature of the case. The patient died; and on examining the body, the prostate gland was found a good deal enlarged: there were three cysts of various sizes communicating with the bladder, and formed in the manner which I have just described. The largest of these was situated between the bladder and the rectum, and contained half a pint of pus. There was no ulcerated surface: and the pus was evidently secreted by the mucous membrane of which the cyst was composed.

It is not uncommon for an abscess to form in the substance of an enlarged prostate. I examined the body of a gentleman who died labouring under this disease, in whom, on making a section of the prostate, there were found several small collections of a muco-purulent fluid, having

the appearance of pus mixed with the natural secretion of the gland. Sometimes the abscess attains a very considerable size, presenting itself, at last, in one or another situation according to circumstances. A gentleman who had laboured under enlargement of the prostate for many years, complained of uneasy sensations about the hips, extending down the thighs. At the same time his pulse was somewhat accelerated, and he was subject to attacks of chilliness, not amounting to rigors. He was in the habit of introducing the catheter, and he observed that it entered the neck of the bladder with some degree of difficulty, as if the urethra, where it passes through the prostate, was contracted in its diameter. These symptoms had existed for many months, when at last, while he was in the act of using the catheter, the abscess burst, and several ounces of pure pus were discharged by the urethra. I had another patient who complained of similar sensations, and also of an increased difficulty in introducing the catheter, so that I was led to believe that an abscess had formed in the prostate. When he had continued in this state for many weeks, an abscess burst into the rectum, discharging a considerable quantity of pus, and this was followed by the relief of all the symptoms. In a third case, the patient not content with leading the quiet life, which I had recommended, returned to his favourite pursuit of hunting. The formation of an abscess in the prostate was the consequence. When I was

again consulted, the abscess had presented itself in the perineum. I opened it with a lancet, and some ounces of pus escaped. However, the whole of its contents were not freely discharged through the artificial opening, and the abscess afterwards burst into the urethra. For a long time matter continued to flow in large quantity by the orifice in the perineum, and by the urethra also. At last the quantity of discharge underwent a sensible but gradual diminution. It had not, however, entirely subsided when I last saw the patient, which was more than two years from the period of the abscess having been opened.

In one of the cases which I have just related, it was found, on dissection, that suppuration had begun to take place in the substance of the prostate, probably in its excreting ducts; and I conclude that such is the origin of the abscess in the greater number of cases in which an abscess is formed. It is, however, not improbable that in some instances suppuration may take place in the cellular membrane external to an enlarged prostate, as an abscess connected with a diseased lymphatic gland is often situated, not in the substance of the gland, but on its surface, in the cellular membrane between it and the skin.

Ulceration of the surface of that portion of the prostate which projects into the bladder, occurs occasionally in the very advanced stage of the disease. An elderly gentleman, who laboured under disease of the prostate gland, and was in

consequence unable to empty his bladder by his own efforts, was in the habit of relieving himself by the introduction of the catheter twice or three times daily. He had gone on in this way for a year and a half, when he began to experience great uneasiness as soon as a very few ounces of urine were collected in the bladder, and was, in consequence, under the necessity of introducing the catheter four or five times in the twenty-four hours; at the same time that the urine became dark-coloured, as if from a small admixture of blood. These symptoms gradually increased, until at last the accumulation of even two or three ounces of urine produced violent spasms of the bladder and abdominal muscles, attended with such agonising pain that he could not forbear screaming. The introduction of the catheter relieved him for a time; but, in the course of one or two hours the pain and spasms returned as severe as before, and continued until the catheter was again had recourse to. He continued in this state nearly three weeks, and at the end of that period died, as if exhausted by excessive suffering. On examining the body after death, the prostate gland was found much enlarged. The posterior middle portion of the prostate projected into the bladder, forming a tumor as large as a walnut, and one of the lateral portions projected in the same manner of a still larger size. The surface of each of these tumors was in a state of ulceration. The mucous membrane of the bladder was almost of a black colour, in

consequence of its vessels being very much loaded with blood. In another patient, in whom symptoms of the same kind, but less in degree, had existed for more than a year before the disease terminated in death, the prostate was found to be ten or twelve times its natural size, making a large circular projection into the bladder, round the internal orifice of the urethra. Nearly the whole of this portion was superficially ulcerated, and in some places the ulcerated surface was incrusted with a thin layer of coagulated lymph.

A prostate which is extensively ulcerated is liable to bleed; but this may be the case also with a prostate which is not ulcerated, or which is ulcerated only to a small extent. Hæmorrhage may, in fact, take place from an enlarged prostate as from any other tumor. Generally, the hæmorrhage is small in quantity; but sometimes it is abundant and alarming. A gentleman laboured under disease of the prostate. He was in the habit of introducing the gum catheter himself. One evening he observed that blood flowed with the urine. In the course of the night he called me up, and I found him with the bladder enormously distended, prominent in the abdomen as high as the navel, and blood still flowing from the urethra. I introduced a large catheter, but no urine escaped. The bladder was distended, not with urine, but with blood. I directed the patient to lose blood by cupping in the loins, and to remain quiet; and, under this treatment, the hæmorrhage ceased; not, how-

ever, until a very large quantity of blood had been lost. The catheter was afterwards introduced three or four times daily. The blood by degrees became dissolved in the urine, and after two or three weeks the urine was as clear as it had been before the attack of hæmorrhage took place. But the pulse was frequent, the skin hot, the tongue dry and brown, and the patient survived the hæmorrhage only a month. In the *post mortem* examination, I found the mucous membrane of the bladder extensively inflamed; a large tumor of the prostate projected into the bladder; and it appeared to me that I could discern the exact spot in which the vessels of the tumor had given way, and from which the hæmorrhage had proceeded. I have seen many other cases of hæmorrhage from the prostate: I had one patient, in particular, who had two attacks of hæmorrhage even to a greater extent than in the case which I have just related; from both of which, however, he recovered, under the treatment which I shall describe hereafter.

I have already explained to you in what manner the bladder suffers in consequence of the enlargement of the prostate gland. The kidneys suffer also. It is these renal affections which principally baffle our skill, and render vain all our efforts for the patient's relief in neglected cases of diseased prostate, and they have, therefore, the strongest claims on our attention.

In many cases the secretion of urine is considerably augmented. There is a large flow of

urine, of a pale straw colour; and this may take place without any considerable alteration in the condition of the kidneys that we can discover on dissection. In one instance, in which the urine had been such as I have described, for some years before the patient died, both kidneys were found of a very pale colour; and the glandular structure of one of them was much diminished in bulk, the pelvis being at the same time considerably dilated. In other respects the appearance of these organs was the same as under ordinary circumstances.

There are other cases in which the secretion of urine is much diminished in quantity. My attention was first called to this fact by the following case, which came under my observation many years ago. A man, who was not much past the middle period of life, but who was old in constitution, had symptoms of enlargement of the prostate gland for two years or more before I saw him. At this time he was harassed by an incessant desire to void his urine. But the quantity which he voided at one time was very small, so that the whole amount of what was discharged in twenty-four hours did not exceed half a pint. He complained also of pain in the loins, extending across the abdomen. He was subject to occasional attacks of chilliness, but his skin was usually hot and dry, and he had a frequent pulse. On introducing a catheter into the bladder, I drew off half a pint of urine, although the patient had made water immediately before the

operation. The introduction of the catheter was repeated twice daily; and under this treatment the quantity of urine drawn off gradually diminished; so that, at the end of a fortnight, the patient was enabled to empty his bladder by his own efforts. As the quantity of urine retained in the bladder became smaller, so the secretion became more abundant, until it amounted to two pints or more in the course of the day and night. Under these circumstances the patient returned to his home in the country, and I have had no opportunity of learning in what manner the case terminated.

I have known the secretion of urine to be completely suppressed, even under the continued use of the catheter. I attended a gentleman, about seventy years of age, with disease in the prostate. I had instructed him in using the catheter for himself, and he drew off his urine regularly. Some months after I first saw him, he observed that he drew off less urine than usual; and that the whole quantity of urine secreted in the day and night was much diminished. There was no distension of the bladder. The catheter entered the bladder readily, and drew off whatever urine there was there, but that was very little. At last the urine was reduced in quantity to three or four ounces daily, and I believe to less. Now another order of symptoms began to show themselves. The legs became œdematous: this was followed by difficulty of breathing: the patient was almost suffocated,

except when his shoulders were very much raised by a number of pillows under them. Then he became drowsy; afterwards comatose, with dilated pupils. There were all the symptoms of effusion of fluid into the chest, and ventricles of the brain; and with these symptoms he died. I have no written notes of the case, but if my recollection be accurate, not above ten days or a fortnight elapsed from the time when the secretion of urine was first observed to be diminished, to the day of the patient's death. Unfortunately, the relations would not permit the body to be examined.

I was consulted concerning another case which may throw some light on the one which I have just related, in conjunction with my friend Mr. Stanley. We had some difficulty at first in determining whether there was actually a suppression of the secretion of urine in the kidneys, or a retention of it in the bladder; and this difficulty was increased by the circumstance of the patient being unusually corpulent; so that, even if the bladder had been a good deal distended, we should have had difficulty in distinguishing the prominence of it above the pubes. At last, however, we satisfied ourselves that the catheter drew off no urine, because there was no urine in the bladder. The patient died, and Mr. Stanley examined the body. He found a growth of medullary fungus immediately behind the internal orifice of the urethra, projecting into the bladder, and extending to the orifices of the ureters. It seemed

that this disease, at the termination of the ureters, had impeded the flow of urine into the bladder from the kidneys, both ureters being much enlarged, and distended with urine through their whole extent. The kidneys were very soft and vascular, but contained no large accumulation of urine.

In some cases of enlargement of the prostate, chronic inflammation, which has begun in the mucous membrane of the bladder, extends along the ureters to the pelvis and infundibula of the kidneys, and produces those changes in the condition of these organs, which I have already described in treating of diseases of the bladder.

But it often happens that the kidneys are found on dissection to exhibit appearances of disease, although the mucous membrane of the bladder and ureters remains in a healthy state. In some instances they are smaller than natural, of a firm texture, uneven on the surface, as if slightly lobulated; for the most part of a pale yellow colour, but red in spots, in consequence of the vessels of the glandular structure being in those places much loaded with blood. At other times they are increased in size, the glandular structure being at the same time universally of a dark red colour, and softer than natural. In either case it is not unusual to find the adipose substance of the loins of an unusually firm consistence, and having only a slight adhesion to the investing membrane of the kidneys. These appearances may be supposed to mark the early

stage of chronic inflammation of the kidneys. In the more advanced stages of the disease, we find these organs increased in size to a still greater extent; of a dark colour throughout their whole substance, in consequence of increased vascularity; and of a very soft consistence, approaching to that of a fungous or medullary tumor, with collections of pus in various parts.

Whatever may be the state of the kidneys, the ureters are considerably dilated; one, however, generally more than the other. The dilatation of the ureters manifestly arises from the impediment which the loaded state of the bladder presents to the passage of the urine into it; and this sufficiently explains in what manner the enlargement of the prostate operates, so as to lay the foundation of disease in the kidneys.

The various changes which I have described in the condition of the kidneys are marked by corresponding changes in the properties of the urine. At first it is voided of an opal colour, and having lost in some degree its natural transparency. On exposing it to the boiling temperature, or on adding to it a small proportion of concentrated nitric acid, a slight opacity is produced in it, indicating the presence of albumen. As the kidneys become more diseased, the albumen in the urine is more constant in its appearance, and it exists at the same time in larger quantity; so that, on the application of either of the tests which I have mentioned, a dense white cloud shows itself, which is presently precipitated

in the form of a grey deposit. In a still more advanced stage of the disease the urine is of a yellow colour, as if from an admixture of pus; and on being allowed to remain at rest, a yellow sediment, which the eye cannot distinguish from true pus, is found at the bottom of the vessel. This purulent condition of the urine may be the consequence of an abscess bursting into the pelvis of the kidney; but in the greater number of instances it takes place independently of such an occurrence, and even where no abscess has existed. It would appear that the same state of the kidney which leads to the secretion of albumen, may lead to the secretion of pus also. The pus is then uniformly diffused through the urine; whereas, when it is furnished by the bursting of an abscess, it is deposited in large quantity in the first instance, and afterwards only in small quantity, and at uncertain intervals.

In many instances, a considerable time elapses before there is any thing beyond the altered condition of the urine, to lead to the suspicion that disease exists in the kidneys. But sooner or later other symptoms show themselves. The patient complains of an uneasy sensation in the loins, which at last amounts to considerable pain. He feels as if the back required support, and places a cushion behind him for that purpose. Then there is pain extending across the anterior part of the abdomen near the hypogastrium, and sometimes pain, and even chronic inflammation and enlargement of one of the testicles. By

degrees the local disease affects the general system. The patient is observed to be languid and listless; he dislikes exertion, and scarcely pays any attention to things which he would formerly have regarded as objects of the greatest interest. The pulse becomes feeble; the hands and feet are cold; the stomach refuses food; one or two rigors probably occur, which are followed by still more marked symptoms of debility, and these gradually increasing terminate in death.

Yet it sometimes happens that under these circumstances death takes place somewhat unexpectedly at last. I have seen two such cases, in which, although there seemed to be no marks of immediate danger, a change for the worse suddenly took place, and the patients expired before medical assistance could be procured. I suspect that in each of these cases the patient had a rigor, and that, in consequence of the state of exhaustion in which he was, he died while in the state of collapse, or at least before there was time for the reaction of the system to be completely established, as a person sometimes dies during the cold fit of an ague. I cannot offer this, however, as a positive opinion, as I had no opportunity of witnessing the symptoms which immediately preceded dissolution.

The most manifest and important consequences of the chronic enlargement of the prostate gland are those which I have already described, and which are to be attributed to the connection of

the diseased part with the urinary organs. But there are other consequences, less dangerous, but sufficiently distressing, which arise from the contiguity of the prostate to the rectum. When this gland is only slightly enlarged, it produces no inconvenient pressure on that bowel; but when the enlargement is considerable, there is a constant sense of weight and bearing down, and the patient has a feeling which leads him to think that he wants to evacuate his fæces, although the rectum is empty. I attended an old gentleman who suffered from this kind of tenesmus for some years before he died, and to such an extent as to be rendered quite unfit for living in society. Slighter cases of the kind are not of unfrequent occurrence. The patient usually attributes the sensations which he experiences to internal piles: and, indeed, this last mentioned disease is often met with in those who labour under enlargement of the prostate, being probably produced by the pressure of the tumor on the larger hæmorrhoidal veins.

I have already mentioned a case in which an abscess of the prostate burst into the rectum. In this instance the abscess formed a second time, and again made its way into the bowel; after which it healed very speedily, and the patient had never any further inconvenience from it.

LECTURE VI.

Treatment of the Chronic Enlargement of the Prostate Gland.

If you bear in mind that the chronic enlargement of the prostate is not an accidental disease, but one of a series of natural changes which the system undergoes after the middle period of life, you will not be surprised to find that it is but little under the dominion of art. When from any cause the vessels of the prostate are more than usually turgid with blood, the quantity of blood which they contain may be diminished, and thus a reduction of size, to a certain extent, may be effected. It is with this view that we recommend topical bloodletting, the exhibition of gentle purgatives, a moderate diet, and, above all, perfect rest in the horizontal posture. But we are not acquainted with any method of treatment which is capable of restoring the gland to its original condition. I need not occupy your time with a description of all the experiments which I have known to be made with a view to this result, as it would be only to give you a history of their failure. The influence of iodine over the chronic enlargement of the thyroid gland,

has led to, and, indeed, seemed to sanction, the exhibition of it in cases of enlargement of the prostate; but it was productive of no more benefit than mercury, and various other remedies which had been tried previously.

Nevertheless, in these cases, much may be done by means of proper surgical treatment. The prostate of a man advanced in life cannot be rendered like that of a young man, any more than his grey hairs can be converted into black: but the train of evils which the enlarged prostate produces by its influence on the urinary organs may be, in some instances, altogether prevented, and in others very much diminished, so as to remove the patient from a state of extreme, and even immediate, danger to one of comparative security.

In considering the treatment by means of which this object is to be attained, we will suppose, first, that you are called to a patient labouring under a complete retention of urine in the bladder.

The treatment of retention of urine from diseased prostate is one of the most important subjects in surgery. The patient suffers miserably; his life is at stake; he lives or dies according to the skill which you are able to exercise in his favour. The case is altogether different from one of retention of urine from stricture. Bougies are of no service: even if you pass one into the bladder, no urine follows; the parts collapse, and close as the bougie is withdrawn.

Neither is laudanum useful in these cases. Here is no spasm for laudanum to relieve. If it produces any sensible effect, it is that it makes the patient less sensible of pain: it makes him think himself better than he really is. It deceives him and his friends for a time, but it does nothing towards curing the retention.

When the retention of urine has taken place suddenly, in consequence of a sudden addition to the bulk of the prostate, the patient may derive advantage from losing blood. He may be bled in the arm, or cupped in the loins; and I have known this in a few cases to be of itself sufficient to enable him to make water. But in the very great majority of cases the retention can be relieved only by the use of the catheter.

I rarely use any but a gum catheter. It gives you rather more trouble to learn the use of the gum catheter, and to become dexterous in the management of it, than it does to learn the use of the silver catheter. When, however, you have once become familiar with the gum catheter, you will generally prefer it to the other; and there is always this advantage in it, that, when you have succeeded in introducing it into the bladder, it may, if necessary, be allowed to remain there. A gum catheter may be retained in the urethra and bladder with very little inconvenience to the patient, which is not the case with a silver catheter.

As Sir Everard Home has observed, the gum

catheter may be used in two ways: without a wire or stilet, when it is a flexible instrument; or mounted on an iron stilet, in which case it is inflexible. You should be provided with a number of gum catheters, mounted not on small flexible straight wires, like those usually sold by the instrument makers, but on strong iron stilets, having the curve of a silver catheter. The stilets which belong to the larger gum catheters should have flattened iron handles, resembling that of a common sound. Let your gum catheters be kept thus prepared for a considerable time before they are wanted for use. They will then become fixed in the proper curvature. With the stilet such a catheter is as inflexible as if it were made of silver: without it, it is capable of retaining its shape to a certain extent; yet it is flexible.

I always begin with passing such an instrument as this first. If the gum catheter without the stilet will enter the bladder, it is so much the better. It gives the patient no pain: it is incapable of lacerating the urethra, or producing hæmorrhage: it may do all that is required; and it can do no harm, even in a rough hand. If you fail in introducing it, the failure will not make it more difficult to pass another instrument afterwards. In difficult cases, indeed, the gum catheter without the stilet will not succeed. You must then use your gum catheter mounted in the way which I have already explained.

You ought not to use a catheter so large as to give pain; but for the most part you will find one which is large enough to fill the urethra, without stretching it, to be more easy of introduction than a smaller one. A very small catheter approaches to a pointed instrument, and the extremity of it is liable to become entangled in the tumor of the prostate. The stilet ought to be considerably curved. The reason of this is obvious. The tumor which projects into the bladder, and which affords the principal obstruction to the catheter, is situated at the posterior part of the inner orifice of the urethra. A catheter which is slightly curved comes directly in contact with this tumor. In a catheter which is much curved, the point is directed forward towards the pubes, and it avoids the obstruction behind. Always bear in mind, in introducing the catheter, that it is to be used with a light hand. It should be held as it were loosely in the fingers. It will then, in great measure, find its own way, in that direction in which there is the least resistance. If you grasp it firmly, it can go only where you direct it, and it is likely to puncture and lacerate the membrane of the urethra, and the substance of the prostate, and to make a false passage, instead of entering the bladder.

I generally find that I introduce the catheter best by keeping the handle of it at first close to the left groin of the patient. I pass it as far as possible in this position; then I bring the

handle forwards, nearly at a right angle to the pubes, and not elevating it towards the patient's navel. The next thing is to depress the handle, which is to be done gently and slowly, by placing a single finger on it, and pressing it downwards towards the space between the thighs.

In depressing the handle, you generally find the point of the catheter slide into the bladder. Sometimes, however, this does not happen until you withdraw the stilet; and, in the act of doing this, you find the introduction of the catheter to be completed.

Other artifices are necessary, in difficult cases, to enable the catheter to reach the bladder. It may be useful to bend the point forward as it approaches the prostate, either by means of the finger in the rectum, or by pressure made on the perineum. In many instances, the introduction of the catheter will be best accomplished by taking care, while you depress the handle, to keep the concave surface closely pressed against the arch of the pubes, so that it may turn round it as a centre.

But it is impossible to explain to you in words all the minute circumstances which practice and experience will teach you, and on which your success in this manual operation will very much depend.

In some cases of diseased prostate, the urethra becomes very irritable, and liable to spasm at the membranous part. This is observed especially where several rude attempts to introduce the

catheter have been made before you have been called to the patient. Here the gum catheter, on an iron stilet, is certain to bring on spasm, unless it be handled with the greatest dexterity and gentleness; and sometimes it will induce spasm in spite of all your care; so that you cannot make it pass even to the neck of the bladder. But a gum catheter without a wire, being a softer instrument, is not very likely to produce the same effect; and I have frequently found the following method to be successful: — I have passed the gum catheter as far as it could be made to pass without the stilet. It has probably stopped at the neck of the bladder, that is, at the tumor of the prostate. I have then introduced the stilet into the catheter, without withdrawing the latter from the urethra: and thus having made the catheter, without the stilet, pass through the part which is the seat of the spasm, I have been enabled afterwards, by employing the stilet, to direct the point over the tumor of the prostate into the bladder.

When the catheter has entered the bladder, and the urine is evacuated, you must pursue one of two courses: either allowing it to remain in the urethra and bladder, secured by a proper bandage, and with a peg in the orifice, so that the patient may relieve himself whenever he has a desire to void his urine; or, withdrawing it, and re-introducing it as soon as the bladder becomes again distended. Now, I do not mean to lay it down absolutely as a rule, that you should allow

the catheter to remain, but I am certain that it is prudent to do so in the great majority of cases. If you remove it, so abundant is the flow of urine which immediately takes place from the kidneys, that you will find the bladder again loaded, and requiring the re-introduction of the catheter within five or six, perhaps even within three or four, hours. It will be necessary to use the catheter again, after another short interval: and it will often happen, when there has been no difficulty in the first introduction of it, that there is considerable difficulty afterwards.

You avoid all this by leaving the catheter in the bladder; and there is another advantage in this mode of proceeding. The prostate gland is kept in a state of more complete repose, and in one much more favourable to recovery — so far as recovery can take place — than it would be in, if irritated by repeated introductions of the instrument.

After the catheter has remained in the urethra for some days, you may withdraw it; and if the patient is now able to empty his bladder by his own efforts, it may be laid aside altogether; otherwise, it must be regularly introduced once or twice in a day, or oftener, according to circumstances. Where the enlargement of the prostate and retention of urine have come on suddenly, the patient generally regains the power of emptying the bladder in the course of three or four weeks, and sometimes much

sooner; but where the disease has come on gradually, he never regains it completely. In the former case, he may be liable to a recurrence of the retention of urine, at longer or shorter intervals; but in the latter, he is more or less of an invalid ever afterwards.

Before we quit this subject of retention of urine from an enlargement of the prostate, there is, however, another point to be considered. You will *very rarely* fail, by dexterous management, to introduce the catheter; but you *may* fail, nevertheless, in some instances. What is to be done under these circumstances? Are you to puncture the bladder? and if so, in what situation? It will be of no service here to do what some recommend in cases of retention of urine from stricture; namely, to make an opening into the urethra, beneath the pubes. The size of the prostate renders the case unfavourable for the puncture from the perineum, or the rectum. You may puncture the bladder above the pubes; or you may proceed thus: — When all your efforts to introduce the catheter have been unavailing; when you feel the point pressing against the tumor of the prostate, and unable to pass over it; apply some force to the instrument at the same time that you depress the handle. It will generally penetrate through the prostate, enter the bladder by an artificial opening, and relieve the patient; and of course will continue to relieve him, if you allow it to remain in the bladder.

This mode of proceeding has been strongly recommended by some very good surgeons, and I am not aware that it is attended with danger, although it may not be without its disadvantages. There is reason to believe, that in some cases in which this has been done, the natural orifice of the urethra has become so closed that the patient never could void a drop of urine by his own efforts, being compelled to rely wholly on the use of the catheter ever after. Sir Everard Home has published the history of a case of this kind which was attended by Mr. Hunter and himself. You may see the bladder of this patient, with the perforation of the prostate through which the catheter used to be introduced, preserved in the museum of the College of Surgeons. The inconvenience which I have now described does not, however, exist in every instance. An old gentleman, in whom I had purposely perforated the prostate, when he laboured under a retention of urine, ultimately regained the power of making water, so as to be able to dispense entirely with the use of the catheter.

Let us now suppose a case in which a patient consults you, labouring under symptoms that indicate a partial retention of urine in the bladder. He is unable to empty the bladder by his own efforts. You then are to introduce the catheter, and empty it artificially. The remedy seems to be very obvious: yet it had not occurred to surgeons generally, until it was suggested by Sir Everard Home, within the last

twenty-five years; and to him we are indebted for this great improvement in practical surgery. The immediate effect of drawing off the water is to give the patient the greatest comfort. He loses the irritation which tormented him before; he is free from pain; and is no longer harassed by the incessant desire to make water. But the relief is only temporary. In a few hours the bladder is again loaded, and the symptoms return. The catheter is then to be introduced again; and you must continue to introduce it at regular intervals. These intervals will vary in different cases. One patient is quite comfortable if the urine is drawn off twice in the twenty-four hours, while another requires it to be done every six or eight hours. I rarely recommend the catheter to be used oftener than this. If employed six or eight times in the day and night, it is likely to irritate the prostate, and to do harm instead of good. This plan is to be pursued, probably, to the end of the patient's life. It may be distressing to him to be thus dependent on the use of the catheter, but it is the least of two evils. The repeated introduction of it is an inconvenience, but it prevents misery and destruction. Without it, slow inflammation of the mucous membrane of the bladder, extending along the ureters to the kidneys, will supervene; abscess will form in the prostate; and probably stone in the bladder. But where the catheter is used regularly, these evils are at any rate delayed for a considerable time, and in

by far the greater number of cases are prevented altogether.

But is the patient to be subject to the daily attendance of a surgeon for the remainder of his life? This cannot be necessary. Let him learn to introduce the catheter for himself. If possible, let him use the gum catheter without the wire or stilet. It is less likely to occasion irritation than a harder instrument, and he can never with this do himself any material injury.

Now, it is this continued use of the catheter in those cases in which the patient is unable completely to empty the bladder by his own efforts, which constitutes the principal part of the treatment to be employed in ordinary cases of disease of the prostate gland. In some cases nothing more is required; and the patient who is dexterous in the use of the catheter, and who is careful never to neglect the regular introduction of it, passes through the remainder of his life, an invalid, indeed, but with little or no actual suffering; and dies at last of some other disease, entirely independent of that which exists at the neck of the bladder.

But there are many cases in which this is not in itself sufficient, and in which other treatment is necessary to remove or palliate the distressing and even dangerous symptoms which arise in the progress of the complaint.

When the mucous membrane of the bladder is affected by slow inflammation, the patient complaining of augmented irritation and pain, and the

urine depositing ropy, adhesive, alkaline mucus, you are to employ those remedies which I recommended formerly under these circumstances, when speaking of diseases of the bladder: such as small doses of the cubebs pepper; the decoction of the Pareira brava, combined with tincture of hyoscyamus, and mineral acids; opiate clysters or suppositories; and rest in the horizontal posture. By proper attention, you may generally relieve the symptoms of chronic inflammation of the mucous membrane which occur in consequence of a diseased prostate, when they exist in a moderate degree. When, however, the case has been long neglected, and the inflammation has extended from the bladder to the ureters and kidneys, neither these nor any other remedies will be of real service, and the patient will sink, in defiance of all your skill, under his complicated maladies.

If the patient labours under such symptoms as lead you to believe that there is inflammation of the prostate, which, if it proceeds, may terminate in the formation of abscess, take blood from the perineum by leeches or cupping, administer gentle aperient medicines, and advise the patient to avoid all but the most moderate bodily exertions. By these means you will often succeed in preventing suppuration taking place. If abscess, however, be already formed, and has burst in the perineum or into the rectum, nothing is required, or at least nothing can be done, beyond maintaining as much as possible the

general health, so that the power of the patient's constitution may be under the most favourable circumstances for repairing the mischief which has taken place. If the abscess has burst into the urethra, or at the neck of the bladder, it is very desirable to avoid, for a time, the frequent introduction of the catheter, the point of which is liable to become entangled in the abscess, producing a fresh attack of inflammation, and perhaps sloughing, of its inner surface, with a train of dangerous constitutional symptoms. Under these circumstances, I generally allow the gum catheter to be constantly retained in the urethra and bladder, until there is reason to believe that the abscess is healed. The catheter used on those occasions should be rather less than the middle size. A catheter, which completely fills the canal of the urethra, may press on the orifice of the abscess so as to interfere with the free discharge of its contents, and thus may increase the evil which it is intended to remove. In some cases, however, after the formation of abscess, the neck of the bladder becomes so tender, that the constant retention of the catheter cannot be endured. We have then no alternative: the catheter must be used at stated periods, great care being taken that its point does not penetrate into the cavity, nor even into the orifice of the abscess.

An abscess which has an external opening is likely to discharge its contents more freely, and, therefore, heals more readily, than one which has burst into the bladder, or urethra, or rectum.

Whenever, therefore, the symptoms lead us to suspect that suppuration is taking place, we should from time to time examine the perineum and scrotum, and not hesitate, where any tumor can be discovered, to make a puncture with a lancet, without waiting for it to present itself at the surface.

In those cases in which there is reason to believe that the diseased prostate is in a state of ulceration, the distressing symptoms, which arise, are to be combated chiefly by the free use of opium, administered in the form of clysters or suppositories. In some instances, the patient enjoys on the whole more comfort if the catheter be allowed to remain constantly in the urethra and bladder: in other instances it is the reverse, and the catheter must be introduced occasionally, that is, whenever a moderate quantity of urine is collected in the bladder, being withdrawn immediately on the bladder being emptied.

Hæmorrhage from the prostate is to be treated like any other internal hæmorrhage; and it will cease, in ordinary cases, if you take blood from the loins by cupping, administer a saline purgative, and keep the patient on a low diet, and in the horizontal posture. Where the hæmorrhage is unusually great, blood should also be taken from the arm. The object of blood-letting here is to lessen the force of the heart's action; and in some cases it will be right to bleed the patient, even until syncope is induced. Those medicines which operate as styptics when taken

internally, and which are useful in cases of hæmorrhage from the lungs, are also useful in cases of hæmorrhage from the prostate. I had a patient with very diseased prostate. A frightful hæmorrhage took place. The usual methods of treatment were adopted, but were of no avail. The skin became pale; the pulse became weak; and the patient was exhausted: yet the bleeding continued. Large quantities of blood were drawn off with the catheter; nevertheless, the bladder continued to become more and more distended with blood, and was felt prominent in the belly as high as the navel. All other remedies having failed, I gave the patient a dose of the nostrum known by the name of Ruspini's styptic, and repeated the dose two or three times in the course of the next twelve hours. In about half an hour after the first dose was taken, the hæmorrhage ceased, and it never recurred.

I have said that in this case the bladder was distended with blood, forming a tumor in the abdomen as high as the navel; and this great evil remained, although the hæmorrhage had ceased, giving the patient all the torment of a severe attack of retention of urine. In order to relieve him, I left a gum catheter in the urethra and bladder, and at intervals injected some tepid water into the bladder with a syringe. Every portion of water dissolved a portion of the blood; and by means of the same syringe I was enabled to draw the blood which was thus dissolved out of the bladder. By performing this operation in

so careful a manner as not to produce any fresh hæmorrhage, and repeating it over and over again, in the course of forty-eight hours I succeeded in emptying the bladder completely of the blood which had been accumulated in it. The patient lived for a year and a half afterwards, and there was no reason to believe that any ultimate harm arose from the bleeding.

So far the treatment of the chronic enlargement of the prostate gland is sufficiently simple. It becomes more difficult, and a greater degree of circumspection is necessary in forming a prognosis, in those cases in which the original disease is complicated with a secondary disease of the kidneys.

You are not to suppose that there is a serious affection of the kidneys, in every case in which the urine is albuminous. There is reason to believe that a small quantity of albumen may be furnished by the bladder itself, both where there is a stone in the bladder, and where there is a tumor of the prostate projecting into it. The complication which I have just mentioned rarely exists, except where the disease of the prostate is of long standing, and where the use of the catheter has been injudiciously neglected. Under these circumstances, if you find the urine albuminous, you may suspect the existence of disease in the kidneys. This suspicion will be confirmed if the quantity of albumen be large, or if the urine be purulent, or if the patient complains of pain, or even of a sense of weakness in the loins.

If, in addition to these symptoms, there is a general feeling of lassitude and weakness, an indisposition to exertion, and occasional rigors, you may conclude not only that disease exists in the kidneys, but that it has made considerable progress, and, indeed, that it has, in all probability, already terminated in the formation of abscess.

Under these latter circumstances, it may be a question whether the patient's life may be prolonged for weeks, or months, or one or two years, but there is no prospect of a cure. But when the disease is in its earlier stage, a more favourable result may be anticipated. Blood should be taken from the loins by leeches or cupping; and some kind of counter-irritation may be kept up afterwards by means of blisters, or the tartar emetic ointment, or issues. Small doses of cubebs pepper, or turpentine, or the powder of capsicum, may be administered internally with advantage. If the urine be acid, the patient may derive benefit from the use of Plummer's pill, or the colchicum given in what are called alterative doses, with an occasional aperient; or if it be alkaline, a manifest improvement will sometimes follow the exhibition of the mineral acids and opium. Of course the catheter is to be employed at the same time; for the immediate cause of the disease of the kidneys is the loaded state of the bladder, and we are not to expect that the effect will cease while the cause which produced it continues to operate.

Yet, however necessary it may be in all cases, there are some in which much discretion is required in resorting to the use of the catheter. What I am about to state is not an opinion formed hastily, but a deliberate conclusion, to which I have been led after having had, for many years, no small share of experience in the treatment of these disorders, as well as considerable opportunities of investigating the morbid appearances which they leave behind them in the dead body. If, in a case of chronic enlargement of the prostate, the patient has been allowed to go on for two or three years, or longer, without the use of the catheter, and, in consequence of this neglect, the quantity of residuary urine in the bladder has gradually increased, so that at last one, or two, or more pints are accumulated in it, the kidneys having at the same time become diseased, the introduction of the catheter according to the rules formerly laid down, so as to empty the bladder two or three times daily, is likely to be injurious rather than beneficial. The patient is, it is true, relieved of many of his distressing symptoms. He is no longer tormented by a frequent desire to void a small quantity of urine, nor by an involuntary dribbling of urine during the night; nor does he suffer the uneasy sensations which, in a greater or less degree, always attend an over-distended bladder; but, in the course of a few days, it is observed that he avoids his usual exertion, that he seems languid, and loses his disposition to take food. Then the

other symptoms of disease in the kidney, which were but imperfectly developed before, become distinctly marked; and he gradually sinks, and dies at the end of a month or six weeks from the time of the catheter being first employed.

I shall describe to you more at length, in a future Lecture, what are the consequences of the operation of lithotomy performed on a person who labours under any considerable disease of the kidneys. At first he is greatly relieved, and often seems to recover rapidly from the effects of the operation; but, in the course of a few days, his bodily powers begin to fail, and death ensues at no distant period; and this happens even where the stone has been of a small size, extracted in the shortest possible space of time, and with the least possible injury to the parts concerned. The resemblance between the effects produced by the use of the catheter, in the way, and under the circumstances, which I have just endeavoured to describe, and those which follow the operation of lithotomy in a patient similarly circumstanced, is too obvious to be overlooked; and I conclude that they are to be referred to a common principle. The system suffers from the shock of the operation, in one case; and in the other case it suffers in the same manner from the impression made on it by the sudden emptying of the over-distended bladder, and consequent removal of the pressure which is made, through the medium of the dilated ureters, on the glandular structure of the kidneys.

Here, then, arises an important practical question. The patient has no chance of recovery without the use of the catheter. Are we to leave him to his fate? or are we to empty his bladder at certain intervals, at the risk of hastening the period of his dissolution? I have no doubt that we may, in many instances at least, obtain the good and avoid the evil, by a slight modification of the treatment. Let the catheter be introduced at first so as to draw off only a portion of the contents of the bladder, and let several days be permitted to elapse before it is completely emptied; care being taken, at the same time, to uphold the patient's bodily powers by the exhibition of ammonia, quinine, and other tonics, exhibited according to circumstances, and combined with the prudent use of wine or brandy, and a plain but nutritious diet.

LECTURE VII.

ON URINARY CALCULI.

The urine in its natural state is composed of a number of ingredients, which are maintained in solution as long as they preserve the temperature of the body. Sometimes, however, it happens that one or more of these ingredients is deposited in a solid form, although the urine has undergone no alteration in its temperature, and even while it remains in the bladder, or in some other of the urinary passages. These deposits may be in the form of small particles, or sand; or in larger masses. We call these latter calculi. Whether there be merely sand, or whether there be actual calculi, the nature of the disease is essentially the same; and it is to these calculous disorders that I call your attention in this and the following Lectures. The subject is one of the highest interest, on account of the number and variety of the phenomena which it embraces; on occount of the pain, distress, and deep anxiety which the patient suffers; and on account of the great relief which the art of surgery is capable of affording in the majority of these cases.

Of Sand in the Urine.

The urine contains a large quantity of a peculiar acid, first accurately described by Scheele, who gave it the name of uric acid, but to which the name of lithic acid is more commonly applied by the chemists of this country. It was formerly supposed that the pure acid was held in solution by the urine. Dr. Prout, however, has shown that the pure acid is almost insoluble, and that, under ordinary circumstances, it exists only in the form of lithate of ammonia, which is a very soluble salt. It is this, and not the uncombined acid, which causes healthy urine to redden litmus paper. In very cold weather, the urine, as it cools, deposits the lithate of ammonia, blended with some other animal matter. It is the lithate of ammonia, also, which forms the principal part of the soft or uncrystallised sediment deposited in the vessel by the urine of persons who labour under dyspepsia, and some other bodily ailments.

Now, if you add to healthy urine some kind of acid, for which ammonia has a stronger affinity than it has for the lithic acid, the juice of a lemon, for instance, the lithate of ammonia is no longer precipitated; and in its place you find a number of small red crystals, resembling particles of Cayenne pepper, at the bottom of the vessel. These are composed of the pure lithic acid. The lemon-juice unites with the ammonia,

and the lithic acid, being nearly insoluble, is precipitated. This, which happens out of the body, may happen in the body also. The presence of another acid in the urine causes the lithic acid, even in the bladder, to be precipitated in the form of a red sand. Dr. Prout says that it is usually the muriatic acid which produces this effect. However that may be, we find that those who are liable to the formation of acid in the stomach are especially liable to the deposition of the red sand. If the digestion be weak, and the food in consequence remains in the stomach long enough to become acescent, the red sand is generated. If the food be indigestible, or if it be taken in too large quantity, the same effect may be produced even in the most healthy person. The free use of fermented liquors, and especially of those which contain acid already, or sugar, which may become acid in the stomach, such as punch and champagne, leads to the same result. Persons who lead a sedentary life, and who never take exercise, so as to produce perspiration, are also especially liable to the formation of red sand. Dr. Philip has made some interesting observations relating to this last point, which are of much practical importance. You will find them recorded in a paper published by Dr. Philip, in one of the volumes of the Medical Transactions of the College of Physicians. It seems as if, during perspiration, something was carried off from the blood in the cutaneous vessels, which would

otherwise cause the urine to be loaded with acid. Sir Gilbert Blane long ago observed that a disposition to calculous disorders is frequently combined with eruptions on the skin (psoriasis), and Dr. Philip's observations will explain the reason of this association.

When the urine contains a superabundant acid, which precipitates the red (or lithic acid) sand, it usually is bright and transparent to the eye, and of a copper colour, resembling in appearance Madeira wine. In general the patient is troubled more or less with dyspeptic symptoms, and frequently he is liable to gout. Many circumstances demonstrate a close connection between this last disease and the formation of red sand in the urine. The same peculiar constitution, the same luxurious diet, the same inactive life, which makes you subject to the one, makes you also subject to the other. The red sand is composed of crystals of lithic acid in its pure state; while the chalk stones which are formed in the bursæ and cellular membrane of gouty patients, are composed of the same acid, in combination with soda.

In what are called the better classes of society, you will find the deposition of red sand to exist chiefly in adult persons, but in the lower classes you find it chiefly among children. These circumstances are easily explained. Adult persons in affluent circumstances, for the most part, lead a more luxurious and indolent life than their children; while among those of lower condition,

the diet of the children is frequently unwholesome, and comparatively little attention is paid to the various derangements of the digestive organs to which they are liable.

In many instances the red sand is voided without any particular symptoms to indicate its formation, and the patient discovers the disease only by seeing it in the urine; but at other times he complains of uneasy sensations in the loins, of pain in the groins, and in the course of the urethra; and sometimes a small quantity of blood is discharged from the urethra, in consequence of its being abraded in some one part by the sharp hard angles of the crystals. Where the urethra is irritable and liable to spasmodic affections, the contact of the red sand induces spasm in it, occasioning a diminution of the stream, and even difficulty of voiding the urine. In such cases you in vain endeavour to cure the stricture merely by the use of bougies; but if you employ at the same time such remedies as tend to prevent the formation of red sand, you cure the stricture easily.

It is of great consequence that you should stop the formation of red sand, both because it is in itself a considerable evil, and because, if neglected, it may lead to the formation of a larger concretion in the bladder. You may almost invariably prevent the formation of red sand by conveying alkaline remedies into the stomach such as potash, soda, lime-water, ammonia, magnesia. Sometimes one, sometimes another, may

be preferable, according to circumstances; and sometimes it may be advisable to give them in combination with each other. If the lithic acid is deposited in small quantity, and the bowels are too much relaxed, (which, however, rarely happens in these cases,) lime-water may be useful. In persons of weak bodily powers, who may be supposed to require cordial and stimulating remedies, you may exhibit ammonia. Dr. Prout recommends the carbonate of potash in preference to the carbonate of soda, for the following reason; — that the soda, under certain circumstances, will enter into combination with the lithic acid, forming an insoluble salt, as bad as the lithic acid itself; whereas the lithate of potash is perfectly soluble; and if this combination takes place, it will pass off dissolved in the urine. On the whole, magnesia, as recommended by Professor Brande, is preferable to the rest. Being in itself insoluble, it cannot enter the circulation except it has first become combined with acid in the stomach or intestine; and hence it does not pass out of the system so soon as the alkalies. The dose of all these remedies must vary according to circumstances. You may give of the pure magnesia from ten grains to two scruples daily, and of the others in proportion.

I have mentioned the *carbonates* of potash, soda, and ammonia, as these agree better with the stomach, and therefore are more proper to be employed, than the pure alkalies. The car-

bonic acid does not interfere with their medicinal effects. There is a remarkable difference in the effects produced on these disorders by the salts, which contain a mineral, and those which contain a vegetable acid. The sulphates, muriates, nitrates, are of no avail; but the tartrate of potash, the tartarized soda, the common saline draught composed of citric acid and potash, all produce the same effect as the pure alkalies, or as the alkalies combined with carbonic acid. This remarkable circumstance was first noticed by Sir Gilbert Blane. Sir Gilbert has also recommended a very efficient method of exhibiting the carbonate of potash in these cases, by giving it in a saline draught with an excess of alkali.

I have said that different doses of the alkaline remedies will be required in different instances. Indeed, a good deal of care is generally necessary to adjust the dose to the peculiar circumstances of the individual case. If you give too little of the alkali, the result is not obtained, and the lithic acid is still deposited, although in smaller quantity. If you give too much, you not only prevent the formation of the red sand, but you render the urine alkaline, and a white sand (the triple phosphate of ammonia and magnesia) is deposited in its place. If magnesia is taken in a larger quantity than is necessary to neutralise the acid generated in the stomach, the patient is liable to the formation of magnesian calculi in the intestines. These last are composed of the magnesia mechanically blended with the

fæces and intestinal mucus. They are not uncommon in these times, when so many individuals are in the habit of taking magnesia in a careless and profuse manner. I have in several instances known a person to suffer a good deal of distress from such a calculus being lodged in the rectum. But cases have occurred, in which the accumulation of magnesia in the intestine has taken place to a very great extent. Mr. Wilson examined the body of a patient in whom, if I recollect rightly, many pounds of magnesia were found collected in the colon above a contracted part of the rectum.

In the exhibition of alkaline remedies, then, you must make each case the subject of a distinct experiment; and that the experiment may be more properly conducted, you must, if possible, make the patient enter into your views, that he may assist your practice by his own observations. You should be provided with paper, coloured blue by an infusion of litmus; and also with the same paper, slightly reddened by immersion in a very weak acid. Healthy urine ought to turn the blue litmus paper a little red, and you ought not to give alkaline remedies in such a dose as to destroy this property altogether; still less ought you to render the urine alkaline. If the urine turns the red paper blue, the patient is in danger of suffering from a deposition of the phosphates, and the alkalies must be given in smaller quantity.

It is to be further observed, that the time

when the urine is most acid, and when the alkalies are most required, is after the principal meal, that is, after dinner. The alkalies are not, indeed, to be given immediately after dinner, for then they are likely to interfere with digestion; but three or four hours afterwards. In some cases it is better for the patient to defer taking his medicine until he wakes accidentally in the middle of the night. In many instances, a single dose of magnesia daily, and that at bed-time, is all that is required; while in others it should be exhibited in the middle of the day also.

But it may truly be observed that this is not striking at the root of the disorder. Alkalies prevent the formation of red sand while they are being taken, but they do not prevent it being formed again as soon as they are left off. The patient cannot well take them for ever; and something further, therefore, is required. When he suffers from costiveness, purgatives must be exhibited; and even in those cases in which the bowels are not particularly torpid, purgatives are useful. The mercurial purgatives are, on the whole, to be preferred. A blue pill may be administered every night, with a draught of infusion of senna and tartrate of potash every fourth morning; or a calomel pill may be given once or twice in a week, at bed-time, and the senna draught on the following morning. When the disease is connected with gout, the patient may take the colchicum with great advantage.

In the first instance, twenty drops of the vinum colchici may be administered twice or three times daily; afterwards, a draught of infusion of senna, with a saline purgative, and forty or forty-five drops of the vinum colchici, may be given occasionally in the morning.

But more, after all, is to be effected by attention to diet and mode of living, than by medicine. Is the patient a great eater, pampering his appetite by a variety of dishes, and thus exciting himself to swallow more food than his stomach can readily digest?—let him make his dinner on a single dish, and eat of that in moderate quantity. Let him also incline to a diet of vegetable rather than one of animal food; avoiding, however, undressed vegetables, and especially those which are acid or acescent; as salad, oranges, and apples. Does he commit excesses in drinking? —let him leave off fermented liquors altogether, or take them only in small quantity; and in particular let him avoid such fermented liquors as, from the sugar which remains unfermented in them, are liable to become acid in the stomach, or which are acid already. The French white wines are injurious in these cases, especially champagne; but none of them are worse than our own English liquor called punch.

If your patient has been in the habit of dining late in the evening, going to bed soon after a hearty meal, he should alter his habits in this respect; dining sufficiently early to allow of his food being digested before he retires to rest. If

he has led a sedentary life, he should cease to do so; walking or riding daily, so as to induce perspiration. A person who takes a good deal of exercise may take liberties as to diet, which he could not otherwise take with impunity. For example: — A gentleman of my acquaintance was accustomed to dine daily in convivial society, eating and drinking heartily, and not stinting himself in the use of champagne. But he was of active habits. He rose early in the morning, walked for an hour or two before breakfast, and came home to breakfast perspiring profusely. If by chance, in his morning's walk, he met any one of his friends, his remark was, that he was doing this to distil off his champagne. By and by some circumstances occurred, which altered his mode of life in this respect; and not long afterwards he consulted me concerning two symptoms which gave him some trouble and anxiety: the one, a quantity of red sand in the urine; and the other, a scaly eruption (*psoriasis*) of the skin. He had continued to eat and drink as usual, but he had ceased to rise early, and to take his long walk, which brought him home perspiring to breakfast; and this alteration in his habits was soon followed by the appearances of the red sand and the eruption.

A copious perspiration may be produced in other ways, as well as by means of exercise. The most certain and effectual method is the use of the sulphur fumigating, or hot air bath. The hot air bath is certainly of great advantage to

those persons who, having led an inactive life, are subject to dyspepsia, and those twinges in the limbs, especially in the feet, which sooner or later are followed by a regular attack of gout; and I believe that it may also be employed beneficially in cases in which the patient suffers from a too large proportion of lithic acid in the urine. It is worthy of observation, that the perspiration produced by the hot air bath is highly acid, reddening the blue litmus paper quite as much as it is reddened by the urine.

The red or lithic acid sand is not the only sand deposited by the urine. In some instances, the urine deposits distinct white particles, which are minute crystals of a triple salt composed of the phosphate of ammonia and magnesia. Here the urine is not acid, but of an alkaline quality: it turns the reddened litmus paper blue, and if very alkaline, it turns the yellow turmeric paper brown. According to Dr. Prout, the formation of the white sand takes place in the following manner: The urine, under ordinary circumstances, contains the phosphate of magnesia, which is held in solution, being a highly soluble salt. But in some cases of disease, the urea of the urine becomes decomposed in the kidneys, and ammonia is evolved, which combines with the phosphate of magnesia, so as to make a triple salt. But the triple salt is insoluble, and, therefore, it is precipitated in the form of a white sand. Dr. Prout observes, also, that the same state of system which leads to the decomposition of urea and the evo-

lution of ammonia, leads also to a more abundant formation of the phosphate of magnesia; and hence arises the immense deposition of white sand, which occurs in some cases. Indeed, this is sometimes so great, that the quantity of phosphate of magnesia, which healthy urine contains, will by no means account for it. I performed the operation of lithotomy on a boy, whose urine, after the operation, deposited such a quantity of the triple phosphate, that his perineum, the inside of his thighs, and the bedclothes, had the appearance of being dusted over with a white powder; and if the white powder was wiped off, the appearance was renewed in the course of a few hours.

The existence of the white sand in the urine is no new discovery: it was described by writers, under various appellations, even before Dr. Wollaston ascertained its chemical composition. It was not, however, until the investigation was taken up by Dr. Prout, that any just notions were formed as to the peculiar circumstances under which this salt is generated.

The state of the system which leads to the production of alkaline urine, and of white sand, is very different from that which is attended with a too acid condition of the urine, and the formation of red sand. The latter occurs in individuals who are over-fed, or over-stimulated, and whose vital powers are not expended by exercise; where there is what Dr. Cullen would have called a sthenic diathesis. But the alkaline

urine indicates an asthenic state of the system; it is the result of debility. In a person who is exhausted by too severe mental or bodily exertions, or who has long been worn by mental anxiety, the urine becomes alkaline. A gentleman, who was at that time attending these Lectures, called on me, not long since, to consult me concerning his general health. After a careful enquiry into the circumstances of his case, I was unable to discover any marks of local disease. It was not one function in particular, but all his functions were deranged. He had been in the habit of sitting up to write out his notes until two in the morning; he had risen from his bed at six; he had worked all day, both with his hands and with his head; in short, he was suffering from excessive labour of both body and mind. I said to him, "Your case is not one which medicine alone will cure; you must study less, and sleep more. Your system is in that state which will lead to your having alkaline urine, if you have it not already." He went into the adjoining room to make water, and immediately on it being voided I tested the urine, and found it to be alkaline, as I had anticipated. I mention this case, that the important fact which it illustrates may be well impressed on your minds; but cases corresponding to it are not uncommon.

In many instances, a course of mercury renders the urine alkaline. In some individuals, even a single dose of calomel will produce the same

effect. Mercury is what is commonly called a *lowering* medicine, and this seems to explain the principle on which it operates. In a person who is already weak, the further degree of exhaustion, which is the consequence of the exhibition of an active purgative, will be sufficient to make the urine alkaline. The too abundant exhibition of alkaline remedies will, as indeed might be expected, lead to the same result. Injuries of the spine, affecting the spinal chord, will also be followed by the secretion of alkaline urine. I first observed this fact as long ago as the year 1807, and have taught it in my surgical Lectures from the time that I began to deliver them in the year 1808. Since then the observation has been confirmed, not only by my own experience, but by that of many other individuals. It is remarkable that this effect is equally produced whatever is the part of the spine that is injured; whether it be the loins, or the back, or the neck; whether the bladder be, or be not, paralytic. It continues even after the patient has recovered of all his other urgent symptoms. I was consulted by a gentleman who had met with a severe injury of the spine more than a year before. Immediately after the accident had occurred, his limbs had become paralytic, but he began to regain the use of them in the course of a few weeks; and when he applied to me he could walk and ride like other persons, but his urine was still alkaline. The same thing occurs where there is disease of the spinal chord independent of

mechanical injury. I have lately attended a gentleman who laboured (as the *post mortem* examination proved) under an affection of the lower half of the chord. It had lost its natural structure, and was in that state to which Rostan has applied the name of *ramollissement*. There was some reason to believe that in this case the disease had been induced by excessive venery—that it was a true *tabes dorsalis*. One symptom was a half-paralytic state of the muscles of the lower limbs, so that the patient could scarcely walk even with the assistance of crutches; another was a highly alkaline condition of the urine. In this case, in the commencement of the paraplegia, the urine was unusually acid, and it was only as the paraplegic symptoms advanced that it became alkaline. This confirms a remark which Dr. Prout has made, that alkaline urine is frequently preceded by a too abundant formation of lithic acid. In females who labour under what may be regarded as aggravated hysterical affections, the urine is frequently alkaline, and deposits the triple phosphate in abundance. The same persons are also liable to have the red or lithic acid sand in the urine; and not unfrequently the two kinds of sand alternate with each other. It is astonishing what a quantity, sometimes of lithic acid, and sometimes of the triple phosphate, passes off with the urine in some of these cases.

Those persons who habitually secrete alkaline urine are generally pale and sallow; incapable

of much bodily and mental exertion; complaining of lassitude and weariness; and when this state of things has existed for some time, their bowels become irregular, being sometimes too much confined, at other times too much relaxed; and they exhibit other marks of debility. Such is the description of the symptoms connected with the secretion of alkaline urine given by Dr. Prout; and your future experience will enable you to bear testimony as to the general correctness of this statement. There are, however, cases to which it does not apply; and I have at this time under my care a gentleman whose urine is alkaline, and has been so for a considerable time, although his general health is good, and he has no other ailment, with the exception of a costive state of the bowels. The urine, instead of the transparent coppery appearance which it possesses, when it is too acid, is voided slightly opaque; of a pale colour, like whey; and being secreted in too large quantity and much diluted, it is of a low specific gravity. The odour is unnatural and disagreeable; sometimes ammoniacal. When allowed to stand even for a short time, the triple phosphate is deposited in the form of a white sand, at the same time that a pellicle is formed on its surface, which shows the prismatic colours, and which Mr. Brande has ascertained to be composed of the triple phosphate also. If allowed to stand for a longer time, the urine becomes putrid, and smells of ammonia.

Besides the triple phosphate of ammonia and

magnesia, another salt, into the composition of which the phosphoric acid enters, is frequently to be detected in the urine, namely, the phosphate of lime. A small quantity of this salt seems to be occasionally generated by a diseased kidney; but by far the greater proportion of it is derived from another source.

Dr. Austin, physician to St. Bartholomew's Hospital, in the year 1791, published a Treatise on Stone in the Urinary Bladder, in which he states, that "the main result of his enquiries has been, that the stone is formed generally in very small parts, and often in no degree whatever, from the urine as secreted in the kidneys, but chiefly from mucus produced from the sides of the different cavities through which the urine passes." The late Mr. Chevalier, in the second volume of the Medico-Chirurgical Transactions, published some observations which were intended to confirm Dr. Austin's hypothesis. These notions, however, attracted but little attention, even when first promulgated; nor is this to be at all wondered at, when we consider how much they are at variance with a multitude of well-known facts. Nevertheless, they are not absolutely without foundation. Dr. Austin was in an error, inasmuch as he mistook the exception to the general rule, for the rule itself; but no further. It is true that calculous matter, in by far the greatest number of instances, is a deposit from the urine, but under certain circumstances it is generated by the mucous membrane of the

bladder. How this happens was first distinctly explained by Dr. Prout.

I have described to you, in a former Lecture, the phenomena which belong to chronic inflammation of the mucous membrane of the bladder. One of its effects is the secretion of a ropy adhesive mucus in a most abundant quantity. This mucus is highly alkaline, containing the carbonate of soda, which is a soluble salt; containing also the phosphate of lime, which is insoluble. The latter is frequently seen presenting the appearance of white streaks in the mucus. In some cases it is produced in still larger quantity, and it comes away, not in the form of white sand, but in that of small white irregularly shaped masses, resembling fragments of mortar.

Now this formation of the phosphate of lime may take place where there is no triple phosphate in the urine; and sometimes, on testing the contents of the vessel, you will find that the urine itself is acid, although the mucus is alkaline. In order that you should succeed in this experiment, you must examine the urine and the mucus, just as the latter has been deposited. If you wait some time longer, putrefaction begins, ammonia is evolved, and the whole is rendered alkaline. The triple phosphate of ammonia and magnesia, and the phosphate of lime, have different origins, and either of them may exist in the urine independent of the other. But it continually happens that you find these two varieties

of the phosphates co-existent in the urine; and this combination is probably produced in one of the following ways: —

1. The primary disease may be a secretion of alkaline urine in the kidneys, and consequent production of the triple phosphate. The alkaline urine is an irritating application to the membranous surfaces with which it comes in contact. If it continues for a certain time, it induces a chronic inflammation of the mucous membrane of the kidneys and ureters, extending to that of the bladder, and inducing the formation of adhesive mucus, containing the phosphate of lime:

2. In other cases, the chronic inflammation of the mucous membrane of the bladder is the primary affection. This cannot exist long without affecting the constitution. It excites, not inflammatory fever, but a low febrile disturbance of the system, attended with much general debility. Such a state of system is very liable to occasion a secretion of alkaline urine in the kidneys: —

And, in one or other of these ways, it happens that the formation of the triple phosphate, and that of the phosphate of lime, are associated with each other; sometimes one, and sometimes the other, being the original malady.

The treatment of patients in whom the urine deposits the triple phosphate, or white sand, is to be conducted on principles very different from those by which you are regulated where you are

required to prevent the deposition of the lithic acid.

The formation of the triple phosphate indicates great general debility. Whatever tends to lower the patient, aggravates the malady. Purgatives are to be exhibited with the greatest caution, and mercurial purgatives especially are to be carefully avoided. All alkaline remedies, such as soda, potash, magnesia, lime-water, are to be avoided also. I have frequently known them to be exhibited by those who did not distinguish the different varieties of calculous disorders from each other, and who had a vague notion of alkalies being good for the gravel; and I have seen them productive of the very worst effects, in many instances. I know it has been said that these remedies may be useful where the digestion is bad, even though the urine is alkaline; and I have myself seen every now and then a case of this description, in which *small* doses of soda were exhibited with advantage;—but I am sure that such cases are to be regarded, not as constituting the foundation of a general rule, but as exceptions to it. Be assured that the rule is, that alkalies are to be avoided. On the same principle on which you avoid alkalies, you are to exhibit acids. This mode of treatment was first suggested by Dr. Wollaston. Mr. Brande recommended the use of vegetable acids in preference to the mineral. At any rate, these are very fit to be employed where they do not disagree with the stomach so as to interfere with digestion. The

patient may drink lemonade, or eat oranges or lemons, in such quantity as he finds necessary. If the vegetable acids, however, as frequently happens, do not agree with the stomach, the mineral acids may be given instead. The dose of the acid must depend on circumstances, and you must regulate it by making frequent examinations of the urine with the reddened litmus, and yellow turmeric paper. From five to ten minims of muriatic acid, given three times daily, will generally be sufficient; but in extreme cases you may give as much as half a drachm, or even a drachm, of the strong nitric acid, in the course of the day, sufficiently diluted with syrup and water. The effect of these large doses of nitric acid in correcting the alkaline quality of the urine is most remarkable. I shall mention to you what happened in the first case in which I prescribed them as an experiment. A young man consulted me, labouring under great irritability of the bladder, the consequence of a highly alkaline state of his urine. The urine was voided turbid, of an offensive ammoniacal odour, depositing a large quantity of the phosphates so as encrust the chamber-pot, and turning the turmeric paper of a brown colour. He was at the same time looking ill, languid, and debilitated. These symptoms were the manifest consequence of over-exertion of body and mind. I prescribed forty-five minims of the strong nitric acid, with an ounce of syrup of orange peel and some tincture of henbane, to be taken

daily in a pint of water. The change produced in the urine was immediate. It assumed a better appearance in the course of a few hours; and when I saw the patient again at the end of four days, it had become actually acid, the general health being at the same time manifestly improved.

In these cases all kinds of tonic medicine are likely to be useful, such as bark, sulphate of quinine, bitter infusions, sulphate of iron, the tincture of the muriate of iron, &c. The diet should be plain, but rather generous, and, at the same time, such as is easy of digestion; consisting of a due mixture of animal and vegetable food. Fermented liquors may be taken in moderate quantity; and, for the most part, the acid wines, as Hock and Moselle, will be preferable to others. Dr. Prout has pointed out the good effects of opium, henbane, and other narcotics. If opium does not interfere with the digestive functions, you may give it in doses of from half a grain to a grain twice or three times daily. In general, in these cases, opium agrees with the patient, and the tongue remains moist, and the digestion unimpaired, under its use. In addition to these remedies, the patient is to avoid all severe exertion of body or mind; and should be kept as free, as possible, from all causes of anxiety, his mind being agreeably occupied by some light employments which do not require any considerable exercise of attention. Courses of mercury, and even a single dose of mercury, are likely to be in-

jurious, as is the case also with antimony, and other diaphoretics.

Where the phosphate of lime is deposited in consequence of a ropy mucous secretion from the mucous membrane of the bladder, you are in the first instance to endeavour to remove the cause on which the secretion depends, namely, the chronic inflammation of the membrane. I must refer you here to the observations which I made in one of my former Lectures, briefly recapitulating, however, what I then said on the subject. Bleeding not only does not tend to diminish the inflammation, but is actually injurious. The first thing to be done is to discover the cause of the inflammation, and to remove it if possible. It may depend on stricture of the urethra, and may be relieved immediately on the stricture being dilated with a bougie. It may depend on a partial retention of urine in the bladder, in consequence of an enlargement of the prostate gland. The bladder must then be emptied artificially by the introduction of a gum catheter once, or twice, or three times daily. It is seldom advisable in these cases to keep the catheter constantly retained in the bladder, for then the catheter becomes in itself a source of irritation, keeping up the inflammation of the bladder, and adding to the cause on which the deposition of the phosphate of lime depends. Perfect rest in the horizontal posture, opium, suppositories, and narcotics by the mouth, will be useful also. The exhibition of the decoction of the root of the

pareira brava is, in many instances, productive of excellent effects. It has a remarkable influence over the secretion of the ropy alkaline mucus. Injections into the bladder of warm water, and even of a weak solution of nitric acid, are sometimes useful; but of the cases in which these last remedies are to be recommended, I shall speak to you more particularly in a future Lecture.

Where these two diseases, namely, the secretion of the triple phosphate of ammonia and magnesia by the kidneys, and of the phosphate of lime by the bladder, are co-existent (and this, as I have already explained, is a very common occurrence), you must combine the two modes of practice which I have just described with each other. They are quite compatible; and, in fact, there are very few of the remedies which are useful in the one case, which are not also useful in the other.

LECTURE VIII.

RENAL CALCULI.

I SHALL now call your attention to those larger concretions, which are formed, and usually retained during a longer or shorter period of time, in the kidney, and which are denominated renal calculi.

There are various kinds of renal calculi, differing from each other in their chemical composition. Some of these are of frequent, and others are of rare occurrence.

1. The most common variety is that which is composed of pure lithic acid. These are generally of a round or oval form, of a light brown colour, and tolerably smooth on the surface.

2. The next in order of frequency are those composed of oxalate of lime. These are of a dark colour, and usually of an irregular figure, with a number of small prominences on the surface; having something of the appearance of a mulberry, and hence denominated *mulberry calculi.*

3. The triple phosphate of ammonia and magnesia is sometimes deposited in the kidney, and I have known the nucleus of a renal calculus to be entirely composed of this salt. This, however,

is a rare occurrence. It more frequently happens, where a calculus has remained lodged in the kidney for a considerable time, that the triple phosphate constitutes its external layer, while the nucleus is either lithic acid or oxalate of lime.

4. Calculi of phosphate of lime are occasionally formed in a diseased kidney, probably not from the urine, but from the other secretions of the affected organ. I have in my collection of preparations of morbid anatomy, two kidneys completely filled with calculi of this description. A gentleman voided by the urethra a small renal calculus, composed of the oxalate of lime. From this time he had symptoms indicating disease in one kidney. A year or two after the first calculus had come away, he voided another calculus. But this was quite different from the former one, being composed of the phosphate of lime. The patient ultimately died of extensive disease in the kidney.

The *renal calculi*, which are composed of lithic acid, occur for the most part in those individuals who have led luxurious and indolent lives; beginning to form, in most instances, at about forty years of age. Many persons, who are subject to the formation of these calculi, are also liable to gout. A patient may have been in the habit of voiding lithic acid calculi; he becomes affected with the gout, and the formation of calculi ceases. But, at other times, the two diseases go on together. Some persons void a great number of these calculi in succession. I

am almost afraid to say how many I have known to be voided by the same individual; but I should think some hundreds. We find them of various sizes, from that of a pin's head to that of a horse-bean.

Calculi of oxalate of lime are much more rare than those of the lithic acid. Fewer individuals are liable to the former than to the latter; besides which, where the disposition to form them exists, the oxalate of lime calculi are not formed in the same numbers as the lithic acid calculi. A patient may void one of these calculi, and never void another; or he may void a second after the lapse of many years. In one instance, however, in examining a body after death, I discovered as many as five or six in one kidney. They had induced extensive suppuration of this organ, and complete disorganisation of its glandular structure, and this disease in the kidney was the immediate cause of death.

Mr. Earle has published a paper, in the Medico-Chirurgical Transactions, in which he endeavours to shew that the formation of renal calculi may frequently be traced to a local injury affecting the loins and kidney. I would advise you to read the paper itself, which contains much interesting information. The only observations which I have to offer on it at present are those which follow: —

First. — Where a disposition to form calculi exists, a mechanical injury may (I doubt not) determine the disease to one kidney rather than

to the other; but this disposition is so manifestly connected with a peculiar state of the system, and peculiar habits of life, (especially in cases of lithic acid calculi,) that we seem to be scarcely justified in regarding it as arising altogether from the agency of a local cause.

Secondly.—It is not improbable that, in some cases in which a mechanical injury has preceded the formation of calculi in the kidney, the first effect of it has been to occasion disorganisation of the glandular structure, and abscess; and that the calculi generated under these circumstances have been composed of the phosphate of lime, derived, not from the natural secretion of the urine, but from the morbid secretions of the diseased part; and corresponding to the concretions of the same kind which are not unfrequently met with in other diseased textures.

When a small calculus is formed in the kidney, it usually occasions some degree of pain in the corresponding loin, and the urine is observed to be tinged with blood, especially after any jolting exercise. These symptoms, however, are by no means constant; and it often happens that the patient has no suspicion of his labouring under the disease until the calculus begins to descend from the kidney into the bladder. Even in its passage along the ureter, if the calculus be very small, it may be productive of little or no inconvenience. If, however, it be large enough to occupy the whole diameter of the ureter, or in any degree to stretch or distend it, there is con-

siderable suffering. When the calculus first enters the ureter, there is usually pain, referred to the region of the kidney and the groin. The pain is often very severe, and in that case attended with sickness and vomiting, prostration of strength, cold extremities, a feeble pulse, and a pallid countenance; in short, the patient is in what is commonly called a state of collapse. These symptoms are followed by pain referred to the inside of the thighs and the testicle; and frequently the testicle is drawn upwards to the groin by a spasmodic contraction of the cremaster muscle: no relief is experienced until the calculus has escaped from the lower orifice of the ureter, and entered the bladder; but as soon as this has happened, the patient's tortures (for they truly deserve that appellation) are at an end. The time occupied by the passage of the calculus along the ureter varies in different cases, according to the dimensions and figure of the calculus, and the impulse which it receives from the current of urine behind it. Sometimes the calculus may reach the bladder almost immediately; at other times it may be lodged in the ureter for many hours, or even for two or three days. Where the passage of it is thus protracted, the parts, to which the pain is sympathetically referred, become tender to the touch, and the testicle not unfrequently is actually inflamed and swollen, the inflammation of it continuing for some time after the cause which produced it has ceased to operate.

It will not be improper for me in this place to notice a set of cases which you will occasionally meet with in practice, especially in the higher classes of society, which bear considerable resemblance to those which I have just described, although the cause of the symptoms is wholly different. In the cases to which I allude, the patient is usually one who has led a luxurious life, and of whom it may be supposed that he has a right to suffer from the gout. He complains of pain at first in the region of the kidney, followed by pain extending downwards in the direction of the spermatic cord to the groin. Afterwards, without any diminution of the other symptoms, there is a frequent desire to void the urine, and the effort made in voiding it is attended with considerable, and sometimes with violent suffering. At the same time the urine is secreted in small quantity, it is of a deep pink colour, deposits a pink sediment, and, when tested with litmus paper, exhibits marks of more than usual acidity. Symptoms such as these may continue for several days, if not relieved by art; but under the administration of suitable remedies they may subside in a very few hours. First, let some blood be taken from the loin by cupping; afterwards administer from a drachm to a drachm and a half of the vinum colchici. This may be followed by half a drachm of the same medicine in the course of four hours, and, where the symptoms are urgent, the latter dose may be repeated in three or four hours more

A draught, composed of infusion of senna, tincture of jalap, and sulphate of magnesia, will probably complete the cure. I imagine that in these cases there is a gouty inflammation of the kidney; at least, I do not see in what other manner all the circumstances belonging to them can be so well explained.

In the majority of cases, a calculus of the kidney finds its way into the bladder soon after its first formation; but in other cases it remains for a considerable time in the kidney, being at last dislodged by some accidental circumstance. For example: — A gentleman somewhat advanced in years, who had observed occasionally that his urine was tinged with blood, was overturned in a carriage in which he was riding with two ladies. It was a large heavy carriage, which came to the ground with great force, causing those who were in it to be severely jolted. When, after the delay which this necessarily occasioned, he reached home, the gentleman found his bladder much distended, and he experienced a violent desire to void his urine; on his making the attempt, however, no urine flowed. There was evidently a mechanical impediment. He strained and strained, and at last the impediment gave way. A renal calculus, which seemed to have the form of one of the *infundibula* of the kidney, was projected with no small degree of force into the chamber-pot, and then the urine flowed in a full stream. In other cases, a stone, which has been long impacted in the kidney, becomes dis-

lodged in consequence of some changes which take place spontaneously in the affected organ, independently of any mechanical injury.

A calculus retained in the kidney produces various degrees of inconvenience to the patient. Sometimes, indeed, it may be said to cause no inconvenience at all, so that calculi are found in the kidney after death, the existence of which had never been suspected during the patient's lifetime. In other cases, the patient complains of pain in the loins, and the urine is occasionally tinged with blood, especially after any jolting exercise, such as riding on horseback. Where these symptoms occur, you will seldom be wrong in concluding that there is a calculus in the kidney. They may, however, arise from other causes. I attended a patient, with Dr. Warren, who was affected (as the event proved) with fungus hæmatodes of one kidney, and in whom these were the only symptoms which were noticed in the early stage of the disease. In the course of time a tumor in the abdomen, in the situation of the kidney, gradually increasing to an enormous size, indicated the real nature of the malady. I was consulted concerning another case exactly similar to that which I have just mentioned; I have also seen other cases in which the urine was tinged with blood, as I was led to suspect, in consequence of a relaxed state of the vessels of the kidney, but in which I had no opportunity of ascertaining by dissection how far the suspicion was well founded.

The dissection of the bodies of those who die labouring under calculi of the kidney, throws great light on this part of pathology. In the early stage of the disease, small portions of calculous matter are found imbedded in the *tubuli uriniferi*, where they form the *mamillary processes*. Afterwards the small calculus is seen partly imbedded in the mamillary process, partly projecting into the *infundibulum* belonging to it. Preparations demonstrating the facts which have just been mentioned, are preserved in Dr. William Hunter's Museum, which was formerly in Great Windmill Street, and which is now in Glasgow. By and by the calculus becomes altogether disentangled from the tubuli and mamillary process, and escapes into the infundibulum and pelvis of the kidney. Probably it is now propelled by the current of the urine along the canal of the ureter, into the bladder; otherwise, remaining in the kidney, it increases in size, in consequence of fresh deposits of calculous matter from the urine. Sometimes it grows so large as to occupy the whole of the pelvis of the kidney, extending also into the infundibula, assuming the form of the parts in which it is lodged, and bearing some resemblance, in its shape and general appearance, to a piece of madrepore. In these cases, the outer layers are very commonly composed of the triple phosphate of ammonia and magnesia, while the nucleus is either lithic acid or oxalate of lime — more frequently the former.

It seldoms happens that the excretory duct of the kidney is completely obstructed; but when it is so, the necessary consequence is, that the urine becomes accumulated in the infundibula, and that these become dilated to a large size, forming membranous cysts; while the glandular structure of the organ is expanded, and in a great measure absorbed, from the pressure which is thus exercised upon it. In some cases you find at last the kidney converted into a large membranous bag, on the surface of which scarcely a vestige of the glandular structure is perceptible, while the interior of it is composed of a number of cells communicating with each other, and all containing urine. In other cases you find the whole kidney wasted, the only remnant of it being a membranous substance adhering to an irregularly-formed calculus. Of course, under these circumstances, no secretion of urine can have taken place from the diseased kidney; but the other kidney supplies its place, and, like a muscle which is called upon to perform double its usual duty, it becomes increased in size in proportion.

Thus you find the kidney in one instance distended into a large bag, and in another wasted and reduced to the smallest dimensions. If you will take the trouble to consider what must happen to a kidney before it can become thus wasted, you will, I doubt not, agree with me in the opinion that these two different conditions belong to the same series of changes. The urine is col-

lected in the pelvis and infundibula; the glandular structure becomes gradually absorbed; the secretion of urine ceases. Then the urine previously accumulated is absorbed in its turn, and the membranous cyst collapses and contracts, until, at last, it becomes a mere capsule, in which the calculus remains imbedded. An enlarged kidney forms a tumor, which can be felt distinctly in the abdomen of a thin person. There is reason to believe that tumors having this origin occasionally disappear; and what I have just mentioned affords a reasonable explanation of this phenomenon.

A calculus lodged in the kidney not unfrequently induces ulceration and suppuration of that organ. It may be, under these circumstances, that the pus escapes with the urine, and passes into the bladder. Then there is little or no constitutional disturbance. The symptoms are all local, and are often such as to draw the attention of the surgeon to the bladder rather than the kidney. A lady consulted me concerning what was supposed to be an affection of the bladder. She had frequent desire to void the urine; she voided it, of course, in very small quantity at each time; she complained of a cutting pain referred to the neck of the bladder, and the urine deposited what appeared at first to be a mucopurulent secretion, but which afterwards had all the characters of true pus, like that from an abscess. Things had gone on thus for two or three years, when the patient was attacked by

other symptoms, such as indicate the passage of a calculus along the ureter. A large renal calculus (I believe a mulberry one) came away, and the original symptoms were relieved. They were not, however, entirely removed, as the urine continued to deposit a very small quantity of pus afterwards.

There are other cases in which a calculus impacted in the kidney produces an abscess having no outlet by which it can discharge its contents into the ureter. Here there is another order of symptoms, different from those which have been just described, but very much resembling those which occur in cases of abscess of the kidney arising from other causes. There is pain referred to one loin, extending to the groin, sometimes upwards towards the scapula, or forward across the abdomen; not in general aggravated by exercise. Not unfrequently there is an irritable state of the bladder, though this symptom does not exist in the same degree as where the pus escapes with the urine. The patient suffers from a sense of remarkable lassitude and depression, and he has occasional rigors. The urine is albuminous. I need not pursue the description further, after the exposition which I made of the symptoms of abscess of the kidney in my Lectures on diseases of the prostate gland.

In a few rare instances, an abscess connected with calculi of the kidney makes its way backwards, presenting itself and bursting in the loins. Some of you will remember a case of this kind

which occurred in this hospital not long since. A woman died, labouring under an abscess in one loin. On examining the body after death, the abscess was traced to the kidney of the same side, manifestly having had its origin in a large collection of irregularly shaped calculi. In the memoirs of the French Academy of Surgery, you will find a paper, in which the author describes two cases of renal abscesses which had burst in the loins, in each of which he succeeded in extracting some calculi through the orifice of the abscess. In one of them, after the removal of the calculi, the abscess healed, and the cure was complete. In the other a fistula remained ever afterwards; in all probability in consequence of some calculi being still lodged in the part. Some of the old surgeons have spoken of an operation for the extraction of calculi from the kidneys. The proposal is absurd and dangerous, if made with a reference to ordinary cases of renal calculi, where no abscess exists. But nephrotomy (as it has been termed) is very practicable where nature, by the formation of an abscess, has pointed out the exact situation of the calculi; so that they may be felt by means of a probe.

I must now call your attention to the treatment of renal calculi.

You will frequently be consulted by persons who are voiding a number of small lithic acid calculi in succession. Those already formed cannot be dissolved. The best thing that can

happen is, that they should pass into the bladder, along the canal of the ureter, and out of the bladder by the urethra. But you may do much towards preventing new calculi being generated. The remedies to be employed are similar to what I have mentioned as applicable to cases in which the urine deposits the lithic acid sand. Purgatives and alkalies may be administered with advantage; and the colchicum, where there is a disposition to gout. Attention to diet and mode of life are of as much importance as medicine. But it is needless for me to say more on the subject at present: I refer you to the observations which I made in the last Lecture.

As to the oxalate of lime, or mulberry calculus, we can do little, probably nothing, in the way of prevention. Fortunately, this defect in our art is of less consequence, as the formation of this kind of calculus is much less likely to recur than that of the lithic acid calculus.

The formation of the phosphate of lime calculus in the kidney always indicates disease of that organ; probably abscess; and it is this disease which demands our first attention. However, we cannot be wrong in such cases if we exhibit the mineral acids, as we should do if any kind of phosphatic calculus were being formed in the bladder.

The passage of a renal calculus from the kidney to the bladder is a natural process, over which we have but little dominion. Where the pain is unusually intense, opium may be ad-

ministered with advantage, but it must be given in large quantity. The patient may also use the warm bath, remaining in it an hour, or even longer. These remedies, however, only tend to the diminution of suffering. Probably drinking plentifully of diluting liquors may be useful, by causing such a rapid flow of urine as will assist in the propulsion of the calculus along the ureter. I have sometimes thought that the patient has derived benefit from the exhibition of an active purgative; for example, a dose of senna, with sulphate of magnesia, and tincture of jalap.

If there are symptoms which lead you to suspect that a stone is lodged in the kidney, it is of course desirable that it should, if possible, be made to pass into the ureter before it has attained such a size as to be incapable of being conveyed along that canal into the bladder. Horse exercise, especially hard trotting, in such a case, generally produces bloody urine. This shews that the calculus is made to undergo some change of position, and whatever produces this effect is, of course, favourable to its escape from the kidney. It is reasonable to suppose, that medicines which occasion a more abundant flow of urine, combined with diluting drinks, may also be useful under these circumstances. Where a calculus retained in the kidney produces considerable pain in the loins and neighbouring parts, the patient will sometimes derive benefit from local blood-letting, by cupping, or by leeches. At other times, from the application of the belladonna plaster. You

may also employ setons and issues in the loins. According to my experience, however, the last-mentioned remedies are seldom very useful, except in those cases in which disease in the kidneys, and especially abscess of the kidney, has taken place as a consequence of the lodgment of the calculus. That they are sometimes eminently useful, under these last-mentioned circumstances, I cannot doubt. I have at this moment a patient under my care, who occasionally voids small calculi from the kidney, labouring, at the same time, under pain in the region of the kidney, with a purulent deposit from the urine; and who has derived marked benefit from a large issue, made with caustic, in the loin to which the pain is referred.

Those extreme cases, in which abscess of the kidney has no means of discharging its contents, and, in consequence, produces symptoms of general depression of the system, with a weakened circulation, and a languor of body, and listlessness of mind, are, I fear, but little under the dominion of our art. We must support the patient by stimulants and tonics, and by making as little demand upon his powers as possible; but, for the most part, we strive in vain against his destiny; and he sooner or later falls a victim to his malady.

Hitherto I have spoken of calculi as being either lodged in the kidney, or as passing from thence to the bladder. But a calculus may be of such a size as to be stopped in its passage

to the bladder, and retained in the ureter. One might suppose, that, under these circumstances, the ureter would become more and more dilated, and, at last, burst, as the urethra bursts behind a stricture. I cannot say that this never happens; and, indeed, Morgagni quotes a case from another writer, in which there is reason to believe that such an event actually occurred. However, it does not always happen, as the following case will prove: I attended it nearly ten years ago with Mr. Merriman, of Kensington; and Mr. Merriman, jun. has lately sent me some notes respecting it. A gentleman, sixty-four years of age, who had been subject to the formation of renal calculi, which had afterwards come away by the urethra, was seized with one of his usual attacks, indicating that a calculus had escaped from the kidney. Instead, however, of terminating in the usual manner, the pain continued unaltered, and he ceased to void his urine. On the supposition that there might be urine in the bladder, the catheter was introduced several times, but no urine flowed. The patient became comatose, and died in a fit of convulsions, eleven or twelve days after the commencement of the attack. On examining the body after death, no urine was found in the bladder. In one kidney there were several calculi: there were none in the other. In the ureter belonging to the latter, and in the upper part of that canal, there was a calculus, as it were, wedged in, of about the size of a horse-bean. It appeared, therefore, that the

circumstance of one ureter being completely obstructed by a calculus had caused a suppression of the secretion of urine in both kidneys.

A case still more remarkable occurred under the observation of my friend Mr. Travers. A patient died, having each ureter, where it arises from the pelvis of the kidney, completely obstructed by a calculus. The consequence of this double obstruction had been the same with that of the single obstruction in the case last mentioned—namely, an entire suppression of the secretion of urine.

LECTURE IX.

HISTORY AND SYMPTOMS OF CALCULI OF THE BLADDER.

Any solid body which is retained in the bladder for a certain time is liable to have calculous matter deposited in it. Thus a calculus is generated, which increases in size more or less rapidly, according to the composition of the urine.

The most common origin of a calculus of the bladder is a calculus which has been formed n the kidney, which has descended by the ureter, and which is either too large to be voided by the urethra, or which is prevented entering the urethra by the projection of an enlarged prostate gland.

In some instances the nucleus is formed by a foreign body, which has been accidentally introduced into the bladder. The late Mr. Wilson removed a stone from the bladder of a female, and, on sawing it through, discovered a common hazel-nut in its centre. Mr. Wilson gave a portion of the stone, with the corresponding portion of the nucleus, to the late Mr. Heaviside, at the sale of whose museum I purchased it, with the rest of his collection of calculi; and thus you have the opportunity of seeing this singular

specimen. A poor man, a gardener in the country, laboured under a stricture of the urethra. Occasionally he suffered from a retention of urine. Being an ingenious fellow, he discovered that he could relieve himself in these emergencies by introducing a flower-stalk through the urethra into the bladder, using it as a bougie. In an evil hour, it happened that the extremity of the flower-stalk was broken off, and lodged in the bladder. The consequence was, that it became encrusted with calculous matter, forming the nucleus of a stone. Some time afterwards, he was admitted into our hospital. Sir Everard Home performed on him the operation of lithotomy. He extracted a considerable oblong calculus, which lay partly in the urethra and partly in the bladder; and, on examining it, the flower-stalk was discovered in its centre.

In one of the preparations in our museum you may see several calculi of a peculiar oblong figure, and of various sizes; the largest about three quarters of an inch in length, and one third of an inch in breadth; but the greater number of them very much smaller, and proportionally narrower; each of which has a small fine hair running longitudinally through its centre. I extracted these calculi from the bladder of a female, and they are composed chiefly of the phosphate of lime; which circumstance, as I have explained already, indicates disease of the mucous membrane. It is difficult to say how these hairs came to be in the bladder; whether

they were common hairs, introduced accidentally, or whether they were some of those hairs which are found occasionally in encysted tumors, and in other diseased structures. I suspect them to be of the latter origin. I attended a gentleman who laboured under stone in the bladder, and also under a disease in the kidneys, of which last disease he died; and in whose urine I every now and then detected small hairs, which I had reason to believe had come from the bladder. Unfortunately, there was no *post mortem* examination, either in this case or in that of the patient from whom these calculi were taken.

In cases of diseased bladder, where the mucous membrane is affected with chronic inflammation, earthy matter, composed chiefly of the phosphate of lime, is formed in small masses, resembling mortar; and any one of these which happens to be retained in the bladder is liable to have additional calculous matter deposited on it; thus forming the nucleus of a calculus.

Calculi of the bladder differ very much in their appearance and other sensible properties: they differ very much also in their chemical composition. Of late years they have been made the subject of repeated and minute analysis. These investigations, so important to human nature, and so interesting to the members of our profession, were begun by the late Dr. Wollaston. He was followed by several other chemists; but those who, after him, have contributed most to the advancement of our knowledge of the sub-

ject, are Mr. Brande, Dr. Marcet, Dr. Prout, Dr. Henry, and Dr. Yelloly. I shall present you with a brief summary of the observations which these distinguished chemists have offered to the world as the result of their researches.

The substances which enter into the composition of calculi of the bladder are the following: —

1. Lithic acid. These calculi are generally of an oval form, and slightly flattened; of a brownish red colour, approaching to that of mahogany; pretty smooth on the surface, but not polished, except occasionally from friction, when there are two or more calculi in the same bladder. If broken, the lithic acid calculi split into concentric laminæ.

2. Oxalate of lime. Calculi of this kind are also distinguished by the appellation of *mulberry*. These are of dark brown colour, approaching to black; rough and tuberculated on the surface, very hard, imperfectly laminated.

3. The triple phosphate of ammonia and magnesia. This salt forms a fragile calculus, and when broken it does not, like the lithic acid calculus, split into concentric laminæ. The surface of it is uneven, covered with minute crystals.

4. Phosphate of lime. Calculi composed of this substance, unmixed with other calculous matter, are rarely found in the bladder; and when they are, there is reason to suspect, from Dr. Prout's observations, that they have their origin in the secretions of the bladder itself, and

not in the urine. These calculi are of a pale brown colour, and of a laminated structure.

5. Although it is rarely that we find a bladder calculus composed altogether of phosphate of lime, we frequently find this salt existing in combination with the triple phosphate of ammonia and magnesia. This mixed calculus is of a white colour; friable; not unlike a mass of chalk in appearance; not in general laminated. It melts into a vitreous substance when exposed to heat in the flame of a blowpipe; and hence it has received the name of the fusible calculus. Neither of the two salts, of which it is composed, (that is, neither the triple phosphate, nor the phosphate of lime) melt in this manner when exposed to heat singly, although they are so easily fused when in combination with each other.

6. Lithate of ammonia. This variety of calculus is of a clay colour; sometimes it is smooth, and at other times tuberculated on its surface: it is composed of concentric layers. Dr. Prout regards it as being confined chiefly to children.

7. Lithate of soda. This is a rare calculus, of a white colour, like the chalk-stones of gout, probably formed where a patient, having a lithic acid diathesis, takes large quantities of soda. I was first informed of the existence of this kind of calculus by Dr. Prout. In our collection of calculi you will see a fine specimen of it, with a deposit of pure lithic acid on its surface: probably there is a nucleus of pure lithic acid also.

8. Cystic oxide. This is a very rare kind of calculus: it is of a white colour; and, when broken, it is found (to use Dr. Prout's own words) not to be laminated, but appearing as one mass, confusedly crystallised throughout its substance.

9. Calculi are sometimes composed of carbonate of lime, but these are of very rare occurrence indeed: the carbonate of lime, however, is frequently blended in small quantity with other ingredients.

10. Dr. Marcet has also described a variety of calculus under the name of xanthic oxide; and another under that of the fibrinous calculus.

11. The fibrinous calculus appears to be composed of the fibrine of the blood. I have never met with but one example of it. This was of an oval shape, about the size of a horse-bean, yellow, semi-transparent, not very unlike amber in appearance, but less hard. When dried, it shrunk to a small size, and became, as it were, shrivelled. I found it in the bladder after death, where no disease of the bladder had been suspected to exist during the patient's life. In this case the kidneys had that peculiar appearance which Dr. Bright describes as observable where the urine has been albuminous. When we consider how near fibrine and albumen are to each other in their chemical relations, we cannot but suspect the fibrinous calculus to be a deposition from albuminous urine. Unfortunately, in this in-

stance, the chemical properties of the urine had not been examined.

In some cases we find a calculus composed throughout of one of the substances, which have been described, nearly pure; but at other times we find these substances variously combined with each other. The best mode of examining a calculus is to have it sawn through the centre. We then find, that in some of the compound calculi, the different substances are disposed in layers, the lithic acid distinct from the oxalate of lime; the oxalate of lime distinct from the triple phosphate, and so on; while in others they are intimately blended together.

It is only when they are divided in the manner which I have mentioned, that we can learn the true history of the formation of calculi. As Mr. Brande long ago observed, the centre or nucleus is generally either lithic acid or oxalate of lime. In many cases the additions to the calculus are of the same chemical composition with the nucleus; in other cases, we find the lithic acid deposited on the outside of the oxalate of lime; and more rarely, the oxalate of lime is deposited on the surface of the lithic acid. The deposit of lithic acid, or oxalate of lime, may take place in the bladder, where there is no evident disturbance of the general health. If the general health becomes affected, and the bodily powers of the patient are impaired, either from the irritation of the stone in the bladder, or from any other cause, the urine becomes alkaline, and, in

consequence, the subsequent additions to the calculus are formed of the triple phosphate of ammonia and magnesia. When the calculus has existed for some time in the bladder, it frequently happens, and indeed it always happens sooner or later, that the mucous membrane becomes inflamed; an adhesive, tenacious mucus is secreted, which contains phosphate of lime; and this, being blended with the triple phosphate, constitutes the fusible calculus. Calculi formed in the ducts of the prostate gland, as I shall explain hereafter, are composed of phosphate of lime, pure, or nearly so. But whatever may be the condition of the bladder, it is a very rare occurrence to find a simple phosphate of lime calculus in it. The phosphate of lime may be deposited in small masses, as I have explained to you formerly; but this nucleus being exposed to the contact of the urine, and the health becoming impaired, as always is the case under these circumstances, the triple phosphate is added to the phosphate of lime, so as to constitute a fusible calculus.

For these latter observations I am indebted to Dr. Prout. He has also furnished us with a knowledge of the following most important and interesting facts in the history of calculous formations. There are but few cases in which the phosphates form the nucleus of a calculus; but being once deposited, they continue to be so, and are not followed by other depositions. The phosphates may succeed the lithic acid, or the oxalate of

lime; but neither of these ever succeed the phosphates. If the external surface of a calculus is composed either of the lithic acid, or of the oxalate of lime, you may be certain that there are no phosphates in the interior; whereas, if there are the phosphates on the outside, the general rule, to which there are but few exceptions, is, that some other substance lies underneath.

Calculous disorders prevail differently in different classes of society, among individuals of different ages, and in different climates and districts.

Among the lower classes, children are much more liable to calculi than adult persons. You know how large a proportion of hospital patients admitted for lithotomy are children. On the other hand, in private practice, that is, among the upper classes of society, very few of our patients are children, and the great majority are persons above fifty years of age. Nor are these things of difficult explanation. In most instances the original calculus is composed of lithic acid, that is, there is a lithic acid nucleus; and, in a former Lecture, I pointed out some circumstances which are likely to make the children of the lower classes, and those who are advanced in life among the higher classes, especially liable to this kind of deposit.

In all classes, persons of a middle age are less frequently affected by stone in the bladder than those who are younger or older.

Patients with enlarged prostate gland are particularly liable to suffer from calculi of the bladder. The tumor of the enlarged prostate usually prevents the bladder being emptied without the aid of the catheter. The consequence is, that if a small calculus from the kidney finds its way into the bladder, it cannot escape in the usual manner by the urethra; and that it lies and grows in the bladder. For the same reason, lithic acid sand, or any thing else which can act as a nucleus, becomes, under these circumstances, the foundation of a stone in the bladder. The bladder is like a chamber-pot that is never washed out, and the component parts of the urine are very liable to be deposited in it, whenever there is any kind of nucleus to which they can adhere. Sometimes a diseased prostate gland causes the formation of calculi in the following manner: — The mucous membrane of the bladder becomes inflamed, as a secondary disease. The mucus secreted by it deposits the phosphate of lime in small mortar-like masses, and each of these becomes the nucleus of a calculus. In these cases, if you examine the body after death, you find probably several calculi of irregular forms, of a white colour, rough on the surface; none of them being of a large size.

But these irregularly shaped calculi are capable of being united with each other, so as to form a single calculus of large dimensions, and of a regular figure. There is a fine specimen of this rare species of calculus in our museum. In

the centre there is a congeries of small masses of calculous matter, with interstices between them, which appear as if they had been originally cemented by mucus. On the outside of these is a shell or crust, formed of the mixed phosphates, regularly disposed in concentric layers. The history of the patient, from whom this calculus was taken, is highly instructive. He consulted me several years ago concerning an enlargement of his prostate gland, which prevented his emptying the bladder by his own efforts. At that time there was no stone, nor any disposition to form one. I instructed him in the use of the catheter, which he introduced two or three times daily, for three or four years, during the whole of which time he suffered comparatively little from his complaint. I always warned him never to leave off the regular introduction of the catheter; telling him, that whenever he did so, besides encountering other evils, he would make himself liable to the formation of a stone in his bladder. At last, in an evil hour, he forgot my admonitions, and listened to some other advice which was given him, that he should lay aside his catheter. At the end of a year from this time I was again called to see him. The urine was now depositing the usual adhesive mucus; and it was evident, from the small masses of the phosphates which it contained, that he was threatened with a stone in the bladder. I made him return to the use of the catheter; but it was too late. The stone went on increasing in size, until it became such

as you now find it to be. It was at last extracted by an operation, from the first effects of which the patient seemed to recover; but he died soon afterwards, manifestly in consequence of disease in the bladder and kidneys; the operation having accelerated, without having actually occasioned, his death.

Women suffer less frequently from stone in the bladder than men. Their more temperate mode of life accounts, in part at least, for the difference. Much, however, is to be attributed to the more simple construction and greater diameter of the urethra, in consequence of which stones are voided by them, which would inevitably have been retained in the bladder of the other sex.

Mr. Copland Hutchison has published some observations, which are intended to shew that calculus of the bladder is very rare among seafaring persons; much more so than in other classes of society: and hence he is led to conclude, that there is something in the peculiar life of a sailor, which is unfavourable to the production of this disease. However, if you bear in mind what I have just now stated, as to the greater prevalence of the disease among children, and among those who are advanced in life, and recollect also that among sailors there are no children, and very few old men, you will, I conceive, find a sufficient explanation of the fact in question, without resorting to Mr. Hutchison's explanation of it. Besides, it must be very difficult to obtain data sufficiently accurate to enable

us to form any positive opinion on such a subject. I have myself operated on two officers in the navy, who were affected with stone in the bladder, and in whom the symptoms of the disease began while they were engaged in active service; and I conceive that these are quite as many cases as were likely to occur in my practice, even supposing the disease were as common in the navy as it is among landsmen. As to the proportion of common sailors who are admitted into the hospital labouring under stone in the bladder, we have no records enabling us to say any thing on the subject.

It is observed that calculi of the bladder prevail particularly in certain districts, while in some other districts the disease is extremely rare. I have a patient who resides sometimes near Norwich, and at other times near Bristol; and who, at the former place of his residence, observes the urine to deposit lithic acid sand, which it never deposits while he is at the latter. This may be attributable, perhaps, in part, to peculiar diet and mode of life. Dr. Prout believes, that hard or impure waters tend to the production of calculi. These explanations however, are not altogether satisfactory. In some districts in which the disease is unusually prevalent, we find, if I am not much mistaken, that there are not only more calculi with a lithic acid nucleus, but also more with a nucleus of oxalate of lime, than in other parts of the country; and it is difficult to understand how the agency

of the same cause should produce in different individuals calculi of such different chemical composition, and depending on such different states of system.

A calculus for the most part lies loose in the bladder, being capable of moving, according to the laws of gravity, from one part to the other of the cavity in which it is placed. It is only in a few cases that it is otherwise. Here is a specimen of encysted calculi. The original disease, as you may perceive, was an enlarged prostate gland, which prevented the patient emptying the bladder. I conclude that the catheter was not used, as it ought to have been, for the purpose of emptying the bladder artificially. The consequence has been, that the patient was continually straining to make water, and that the mucous membrane, by the pressure of the urine, has been caused to protrude in the interstices between some of the muscular fibres, forming small cells or cysts. Some small calculi, which escaped from the kidney, have found their way into these cysts, and have become lodged or impacted in them.

In the preparation which I now shew you, there is a cyst of another kind. The case is in many respects remarkable. I discovered a stone in this gentleman's bladder. But he was advanced in years, and as for the most part he suffered very little inconvenience from the disease, he did not wish to go through any dangerous operation for the sake of obtaining relief;

nor did I think it right, considering all the circumstances, to urge him to submit to it. He went on, in general suffering little or nothing. He was a convivial man, dining a great deal in society, as if he had no ailment. Every now and then, however, he was suddenly seized with the usual symptoms of stone in the bladder, and very severe ones too. He then sent to me: I kept him in the horizontal posture, prescribed him an opiate clyster, and in the course of a few days, sometimes sooner, sometimes later, the attack subsided; he was again at his ease, and enabled to return to his usual habits. I had been in the habit of attending him occasionally for three or four years, when he was seized with a severe cold, which ended in a pleurisy, of which he died. On examining the body, I found the stone imbedded in a cyst near the fundus of the bladder. The cyst was formed in this case, not by the protrusion of the mucous membrane between the muscular fibres, but by a dilatation of both tunics of the bladder, the muscular as well as the mucous. It was such a receptacle as you would suppose a large calculus, which had long been resident in the bladder, might gradually have made for itself. If you look at the preparation, you will see that the stone was not so closely embraced by the cyst as to prevent it occasionally slipping out of it; and I suspect that this actually happened, and that it was, when the stone lay in the cyst, that the patient was free from the usual symptoms

of calculus, and that his sufferings took place when the stone escaped from it into the general cavity of the bladder.

You will hear not unfrequently of calculi which adhere to the bladder; but you may be assured, nevertheless, that this is a very unfrequent occurrence. Adhering calculi are very rare. Ask all experienced surgeons, and they will tell you what I tell you now. It is not very uncommon to find a diseased bladder, a portion of which is incrusted with calculous matter; but that is a very different thing from an adhering calculus, and not at all likely to be mistaken for a stone in the bladder. It occasionally happens that coagulated lymph is effused from the inflamed mucous membrane of the bladder. The inflamed mucous membrane also secretes that adhesive mucus which contains the phosphate of lime, as I explained to you formerly. A portion of the phosphate of lime thus produced, mixed probably with some of the triple phosphate from the urine, is deposited on the lymph, and thus the incrustation takes place. It corresponds exactly to the incrustation of the wound of the perineum which occurs after lithotomy, where the operation is followed by the secretion of the same ropy mucus from the bladder.

In many instances you find only a single stone in the bladder; in others there are two or three stones. In the latter case they are more or less polished on the surface, from rubbing against each other. Occasionally there is a still

greater number of stones in the same bladder, — ten or twenty, or even thirty or forty. The greater the number of stones, the greater the quantity of friction: and you will see in some of these specimens how calculi, under these circumstances, are rubbed into the form of irregular polyhedrons.

We have next to consider the symptoms produced by calculi in the male bladder.

The first thing that will strike you when you come to study the disease in the living person is, the different degrees of suffering to which different individuals are subject, and even the same individual in different stages of his complaint.

The symptoms differ; 1st, according to the size of the stone, the smoothness and roughness of its surface, and its general figure:

2dly, According to the quality of the urine. Thus, the urine may be unusually acid, or it may be alkaline, and depositing the triple phosphate; and in either case it will be too stimulating for the parts with which it comes in contact, and the symptoms of the stone will be thereby aggravated:

3dly, According to the state of the bladder. Nothing aggravates the symptoms so much as the occurrence of inflammation of the mucous membrane. This increases the sensibility of the bladder a hundred-fold, and causes a small stone to produce a much greater quantity of distress and pain than a large one produces under ordinary circumstances.

If the bladder be healthy, a very small stone produces very trifling and, indeed, very equivocal symptoms. The patient has the inclination to make water induced by a rather smaller quantity of urine in the bladder than under ordinary circumstances. He has a sense of irritation, scarcely amounting to pain, referred to the neck of the bladder, to the urethra, perhaps to the hypogastrium, after the bladder is empty. In one instance, for many months the patient complained of nothing except an occasional pain, and that but trifling, on the inside of one groin, and of the urine being tinged with blood, after riding on horseback. Bloody urine, after any jolting exercise, is a strong indication of a calculus somewhere, either in the bladder or kidney. Where it arises from other causes once, it arises from this cause twenty times. But this symptom is often wanting in the early stage of the disease, while the stone is still small, especially where the patient leads (as often happens) an inactive life. A small stone occasionally falls on the inner orifice of the urethra, while the patient is making water, and thus suddenly impedes or stops the flow of urine. This is one of the most characteristic symptoms of the disease in its origin; but even this is often either wanting, or not observed for a long time.

As the disease advances, and the stone grows larger, other and more decided symptoms shew themselves; which may be thus enumerated:—

1. A very frequent desire to make water; the

impulse to do so being sudden and irresistible, and liable to be induced by the smallest change of position.

2. Pain referred to a particular point in the glans penis, at the extremity of the urethra; the pain sometimes being described as a severe yet dull pain; at other times compared to the effect of a hot iron applied to the part — that is, what is called a burning pain. This pain is most severe after making water, and after exercise, when the stone falls suddenly down on the neck of the bladder.

This pain in the glans penis is one of the most marked symptoms of the disease. A child who labours under stone in the bladder, tells you of it, not in words, but by his actions. He is always pulling the end of the penis, and pinching it with his fingers, even so as to cause the prepuce to become elongated. You often find his fingers with the cuticle soft and sodden (as if they had been soaked in hot water), from the urine which has been imbibed.

3. The urine is frequently stopped as it flows from the bladder, by the stone falling against the inner orifice of the urethra.

Now the disease, in some instances, may exist for many years before these symptoms become very severe. A gentleman had experienced some slight symptoms for upwards of ten years; but they were so very slight, that they did not in the smallest degree interfere with his comfort and usual habits. At the end of that time, being ac-

cidentally in London, he consulted me respecting them; but he felt so little inconvenience, and thought so little on the subject, that his doing so seemed to be almost a matter of accident. I examined the bladder, and detected in it this enormous stone which I now shew you. Some months afterwards, his symptoms became much aggravated. He now said that he could bear them no longer, and I removed the stone by the usual operation.

This case, however, is not in the common course of events. In general the symptoms are progressive, and reach their height, so that the patient becomes a very great sufferer, in the course of two or three years.

At first his general health is unaffected; but by and by the health begins to suffer, the urine becomes alkaline, and the triple phosphate is deposited on the original stone. Now all the symptoms are much aggravated. The alkaline urine is more stimulating to the bladder than healthy urine, and this is the principal cause of the patient's increased sufferings. Another reason is, that that state of the general health which causes the alkaline urine to be secreted by the kidney, is attended with an increased or morbid sensibility of the nervous system generally.

As the disease advances, the continued irritation kept up by the stone induces inflammation of the mucous membrane of the bladder. There is now a still further augmentation of the pa-

tient's sufferings. The stone is rolling about in an inflamed bladder; and you know how the sensibility of every organ in the body is increased by inflammation. The existence of this state of things is indicated by the greater pain, and by the desire to make water being almost constant; by the urine coming away offensive to the smell, soon becoming putrid and ammoniacal, and depositing the usual thick, tenacious mucus, streaked with blood. This mucus, as I have already explained to you, leads to the formation of the fusible calculus; and all that I have now stated will lead you to understand that different kinds of calculus are attended with different degrees of suffering. A patient with a simple lithic acid calculus suffers less than one with a calculus composed externally of the triple phosphate; and the latter less than a patient with a fusible calculus. The oxalate of lime or mulberry calculus, on the whole, occasions more distress than the lithic acid calculus: probably on account of the irregularities which so frequently exist on the surface of the former: but it occasions less distress than the calculi composed of the phosphates.

Patients with diseased and enlarged prostate do not, in general, suffer more from the stone in the bladder than other individuals. Indeed, I am inclined to believe, that, on the whole, they suffer less; probably in consequence of the tumor of the prostate preventing the stone falling down on the neck of the bladder. I have, how-

ever, seen three cases, in each of which there was a stone in the bladder, complicated, not only with an enlarged, but ulcerated prostate; and the sufferings of these patients were greater than I had ever before witnessed in persons labouring under the same disease. They were, indeed, most horrible. In two of these cases, the surgeon who was in attendance indiscreetly (as I think) performed the operation of lithotomy. One of them died in about five minutes after the operation; the other became immediately comatose, and died in a few hours. The third patient was admitted into our hospital, under the late Mr. Ewbank. The symptoms were precisely similar to those which existed in the two other cases, and Mr. Ewbank, on the result of these cases being stated, very properly determined not to perform an operation, although the man had come into the hospital for the purpose. The poor fellow died in two or three days afterwards; and, on examining the body after death, we found a large stone and an ulcerated prostate, as had been anticipated.

Calculus in the bladder induces frequently an irritable state of the urethra, and thus causes a spasmodic stricture. It induces also increased efforts of the bladder to expel the urine; and thus the muscular coat of the bladder, after a certain time, always becomes increased in thickness.

Stone in the bladder, in the male sex at least, admits of nothing even approaching to a natural

cure. The patient may live a year, or ten years, or even twenty years in a few rare cases, without any dangerous symptoms being induced. But dangerous symptoms are induced at last; and, if he be not relieved by art, or cut off in some other way, the stone, sooner or later, proves the cause of death. Now, it is worth while for us to consider how this fatal termination of the disease is produced.

I have just mentioned a case in which there was an ulcerated prostate gland, and in which the patient died, no operation having been performed. But ulceration of the prostate is not commonly the cause, nor even the forerunner, of death. In the majority of instances, the immediate cause of death is the inflammation of the mucous membrane of the bladder. A moderate degree of chronic inflammation of the mucous membrane may exist, in a case of stone in the bladder, for a great length of time, without occasioning irretrievable mischief; and, if the stone is extracted, the patient may recover, and be as well as ever afterwards. But if the chronic inflammation becomes aggravated, so as to assume the character of acute inflammation, or even to approach acute inflammation, the situation of the patient becomes dangerous — I may say desperate. The inflammation extends up the ureters to the kidneys. Even the glandular structure of the kidneys becomes affected; it is rendered more vascular and softer than natural. In a woman who died in our hospital, under the care of

Mr. Keate, having laboured under stone in the bladder for many years, the kidneys were found converted into a structure bearing no small resemblance to fungus hæmatodes. I do not say that it *was* fungus hæmatodes, nor do I believe that it was so; but it had, to the eye, much of the same appearance. Sometimes abscesses form in the kidneys, under these circumstances; at other times, where there is no actual abscess, you find, on examining the body after death, a collection of muco-purulent fluid in the pelvis and infundibula. Inflammation sometimes extends through the muscular tunic of the bladder, into the atmosphere of loose cellular membrane by which the bladder is surrounded, and putrid sloughing abscesses are formed in it. I need not enter into a particular history of what occurs where these complications exist. The symptoms of disease in the bladder, or disease in the kidneys, are superadded to those of calculus in the bladder; and it is sufficient for me to refer you to the observations which I made on these subjects in my Lectures on the diseases of the bladder and prostate gland.

In some cases, but these are very few in number, the bladder ulcerates, and the stone escapes from its cavity. The bladder exhibited in this preparation is seen to have been ulcerated at its fundus. There were several calculi, and one of them, as you will perceive, had stuck in the ulcerated opening, and lay half in, half out, of the bladder. A middle-aged man was admitted into

this hospital, in the year 1810, who had laboured under symptoms of stone in the bladder for the preceding ten years. He had also a fistula in perineo. Sir Everard Home proceeded to extract the stone by the usual operation. When, however, he had introduced the gorget, he found the stone (of the size of a walnut) lying in its concave surface, and he removed it with his fingers. No other stone could be discovered. The patient died on the fourth day after the operation. On examining the body after death, the bladder was found to be very much contracted, so that it was scarcely capable of containing an ounce of fluid. That which had been its muscular coat had degenerated into a kind of ligamentous substance. The mucous membrane bore marks of having been in a state of inflammation: it was extensively ulcerated; and the ulcer communicated with an ulcerated cavity in the perineum, in which the stone was lying at the time of the operation. The fistula in perineo communicated with the membranous portion of the urethra. It may be worth while to mention that, in this case, one kidney was reduced to a third of its natural size, and contained a considerable quantity of pus. The ureter on this side had its cavity entirely obliterated: it was nothing more than a ligamentous cord, extending from the kidney to the bladder.

A case came under my observation, in which the patient died in a very short time after the operation of lithotomy, and in which was found,

after death, a very large abscess of the pelvis, communicating with the bladder by an ulcerated opening on one side of the neck of the bladder. In another case, there was an abscess, which occupied nearly the whole pelvis, but having no communication with the bladder. Both of these cases occurred, many years ago, in our hospital, under the care of Sir Everard Home. I mention them, because the patients died so soon after the operation, that it was evident that the abscesses must have existed before it was performed; and that they were the consequence of the disease, and not of the operation. I suspect that abscess in the cellular membrane of the pelvis is not an uncommon occurrence in those cases in which the patient is allowed to linger on and die of the disease.

LECTURE X.

CALCULI OF THE BLADDER, CONTINUED.

MANY of the observations which I have hitherto made are applicable to cases of calculi in the female, as well as to those of calculi in the male bladder. Others are applicable to the disease in the male sex only; and something is still necessary to complete the history of it in the female.

In women, for reasons which I have already mentioned, the disease is comparatively rare. It is, of course, difficult for an individual to form an estimate of the number of cases which occur in women as compared with those which occur in men; but, judging from what has occurred in my own practice, I should say that the proportion is nearly as one to fifteen or twenty. In women, the disease occasions a frequent inclination to make water. There is pain, especially after making water, referred to the extremity of the urethra. The urine is tinged with blood after taking exercise, and it undergoes the changes which cause the deposition of the triple phosphate, and afterwards that of the phosphate of lime, such as I have described in speaking of the disease in the male sex.

Diagnosis of Calculus in the Male Bladder.

You must, of course, satisfy yourself, in the first instance, whether a calculus actually exists in the bladder. The symptoms, in general, are sufficient for this purpose; but you must not rely on the symptoms only. They will rarely mislead you, but they will sometimes. There *may* be a stone in the bladder, without the usual symptoms; and there *may* be many of the usual symptoms, without a stone in the bladder. In children, especially, the deposition of lithic acid sand by the urine will not unfrequently produce, not only pain in the glans, but bloody urine, and all the other symptoms of stone in the bladder. A boy, between four and five years of age, was brought to me who had a constant inclination to make water. He screamed with pain as the urine flowed; he was perpetually squeezing the extremity of the penis between his fingers, as if he referred the pain to that part; and the urine was frequently deeply tinged with blood. I scarcely entertained a doubt that there was a stone in the bladder. I examined the bladder in the way which I shall explain to you presently, but no stone was discovered. I examined it again and again, but still there was no stone. I then enquired more particularly into the child's health in other respects; and the result was, that I was led to prescribe an occasional dose of calomel

and rhubarb, with rhubarb and sal polychrest in the intervals; and under this simple plan of treatment all the symptoms disappeared in the course of a few weeks.

Before you venture to give a positive opinion as to the presence of a calculus in the bladder, you must examine the latter by means of an instrument introduced into it by the urethra. Thus the stone may be made cognizable to the senses, and you may know that it exists, with as much certainty as if you actually saw it. We commonly employ for this purpose the instrument which I show you now, an iron sound. It is shaped like a catheter, but is rather longer than the catheter towards the point, in order that a larger portion of it may enter the bladder, and that it may be capable of reaching quite to the fundus. The sound ought to be large enough nearly to fill the urethra, but not to stretch it. If it be too large it is closely embraced by the urethra, and the free motion of it in the bladder, so necessary for detecting a calculus, is prevented. The handle of the sound should be flattened, smooth, and polished, in order that the fingers may be in contact with as many points as possible. In general we introduce the sound while the patient is lying on his back, with his shoulders a little elevated; but sometimes we detect the stone more readily when the patient is in the erect posture. It is also more easy to discover a small stone if there be some urine in the bladder, than if the bladder

be altogether empty. In the latter case the stone is liable to be concealed, and defended from the contact of the instrument, by a fold of the mucous membrane. Where the stone is large, whether there be or be not urine in the bladder, the sound strikes it readily and at once. If the stone be small, it is often necessary to carry the sound carefully from one part of the bladder to another, and examine the different parts in succession before the stone can be discovered. If the symptoms of stone are well marked, it will be unwise of you to conclude that there is no stone, because you do not perceive it on the first examination. I have known the most practised surgeons, with the most delicate sense of touch possible, use the sound several times, where the stone was of a small size, before they felt it so distinctly as to be satisfied of its existence.

In some cases, a stone which has not been discovered by means of the sound, is at once detected by means of the elastic gum catheter. This is an observation of Sir Everard Home's, the correctness of which I have had frequent opportunities of verifying. The gum catheter should be introduced without the iron stilet, while the patient is standing, with his bladder full of urine. You allow the urine to flow through the catheter, and as the last portion of it comes away, the stone falls down on the extremity of the instrument, in withdrawing which you feel it quite distinctly. Judging merely from

the texture of the gum catheter, I never should have believed it capable of affording such certain evidence of a stone in the bladder as I know it does from experience.

In some instances you may feel a stone in the bladder with the finger introduced by the rectum. This method of examination is often useful in children, where the stone is above the middle size. It seldom affords you any assistance in the adult, except where the stone is of extraordinary dimensions.

It is not sufficient that you should ascertain the existence of a stone: it is of importance also that you should, if possible, learn something as to its size and composition.

You cannot, of course, actually measure or determine accurately, the size of a stone which lies concealed in the bladder; but, nevertheless, you may form some notion on the subject which will not be very far from the truth. If the symptoms shew that the stone has existed only a short time in the bladder, and the urine has been, and is, of an acid quality, you may conclude that it is, in all probability, composed either of lithic acid or of oxalate of lime. Such stones are not of rapid growth; and under these circumstances it is not probable that the stone can be of large dimensions. But if the urine has become alkaline, you will know that the last deposited layers of the stone are composed of the phosphates; and stones of this last description are of more rapid growth, often attaining a considerable size in a

moderate space of time. Whatever may be the composition of the stone, if it has existed for a great number of years, it is to be expected that it will prove to be a large one. These considerations, however, carry you only to a certain point. You may obtain a more precise knowledge in the following manner. — Measure the stone, by causing the convex part of the sound to traverse its upper surface from one extremity of it to the other. When the bladder is full of urine, strike the stone with the sound, or with the end of the gum catheter. Observe what quantity of force is necessary to push it out of the situation in which it lies; and, accordingly, as it is displaced easily or with difficulty, so you may form an estimate of its weight and magnitude.

Treatment of Calculi of the Male Bladder.

When a stone passes from the kidney into the bladder, the diameter of which is less than that of the urethra, it is usually conveyed into that canal by the impulse of the stream of urine, and thus the patient gets rid of it. Sometimes, however, even a very small stone is prevented escaping in this manner, in consequence of an enlargement of the prostate gland, forming a tumor projecting into the bladder, and making a kind of valve behind the orifice of the urethra. Many a person is liable to the descent of calculi from the kidney for many years, which are

always passed with the urine, until he becomes somewhat advanced in life. Then the prostate becomes enlarged, and the calculi, which descend afterwards, are lodged in the bladder.

Under these circumstances, it will be prudent for the patient to void his urine lying on his face, or leaning very much forward, so that what we call the anterior may become the depending part of the bladder. You will observe, that the valve made by the projecting tumor of the prostate is almost invariably on the posterior part of the bladder — that is, towards the rectum; and if the patient voids his urine in the posture which I have mentioned, the stones are less likely to be interrupted by it, than if he voids it in the usual manner. This, at least, is good in theory, and I may say that it is good in practice also; for a patient of mine, an elderly gentleman, whom I advised to do what I have just mentioned, very soon became relieved of a small stone which had been for some time in the bladder.

A stone which is of larger diameter than the urethra, of course cannot be voided by that canal. But you may dilate the urethra; and by doing so I have, in a great many instances, enabled the patient to pass a stone which had been for some weeks, or even for some months, in the bladder, and which he certainly could not have voided otherwise. The case here admits of little delay. Every day adds to the bulk of the stone, and diminishes the chance of success. Introduce a bougie, or a metallic sound, of such

a size as the urethra will admit without inflammation being induced. Every day, or every other day, according to circumstances, introduce one a little larger; and thus you may dilate the urethra gradually, until it is a good deal larger than its natural size. The degree of dilatation of which the urethra is capable, varies in different cases; but it is generally considerable. When this process has been carried as far as it can be, let the patient drink plentifully of diluting drinks. It may be worth while even to give some of the compound spirit of juniper, or other diuretic, at the same time; and the calculus will probably, some time or other, be carried, by the current of urine, into the dilated urethra. You may add to the chance of the expulsion of the calculus, by adopting the following method. — Once daily introduce a large bougie into the urethra and bladder, and there let it remain. Then let the patient drink plentifully of barley-water, or toast and water, or weak tea; so that the bladder may become loaded with urine. When the patient can bear the distension of the bladder no longer, let him place a vessel on a chair, standing, and leaning forward over it. Then, on the bougie being withdrawn, the urine will follow it in a full stream, and the calculus may probably accompany it. I learned this mode of treatment from a patient who contrived it for himself, and who in this manner became relieved of three considerable calculi, for which an intelligent and experienced surgeon, in a provincial town, had

recommended him to undergo the operation of lithotomy.

If a small stone cannot be made to pass in the way that I have mentioned, you will probably succeed in extracting it from the bladder by means of the urethra forceps. Indeed, I may say that you will never fail in doing so, unless the stone is beyond a certain magnitude, or there is something in the condition of the bladder to prevent its retaining a moderate quantity of urine; or unless there is a large tumor of the prostate projecting into the bladder, behind which the calculi may lodge, out of the reach of the instrument.

I cannot but regard the invention of this method of extracting small calculi from the bladder, as one of the greatest achievements of modern surgery. The credit of it belongs to a distinguished individual, who has contributed largely, in a great number of other ways, to the benefit of mankind, and the improvement of our interesting and important art. I need not tell you that I mean Sir Astley Cooper. But even he would not have been able to succeed in the plan which he had conceived, if he had not been aided by the mechanical talents of Mr. Weiss, who, when the object in view was explained to him, with his usual zeal and ingenuity contrived the forceps which I now shew you. I need not give you a particular description of their construction, as you may examine them for yourselves. But you will observe, that they admit of

being opened and closed in the bladder, without distending or otherwise irritating the canal of the urethra. When you employ these forceps, the bladder should always contain a moderate quantity (that is, from six to eight ounces) of urine. If the patient, however, has lately made water, you may inject some tepid water into the bladder through a catheter, which, of course, will answer the same purpose. It is generally prudent to ascertain first where the stone lies in the bladder, by examining it with an iron sound. Then introduce the forceps in their closed state, previously warmed and oiled, directing them towards the stone; and when you feel them resting lightly on it, open the blades cautiously, and endeavour to seize it. If you succeed, and the stone is of a small size, you easily extract it. The forceps do not close on the stone with much force, or make much pressure on it; but they are themselves compressed and squeezed by the neck of the bladder, and afterwards by the urethra; and thus the stone is firmly grasped, and prevented dropping out of the instrument. In this manner Sir Astley Cooper has succeeded, in a great number of instances, in removing small stones from the bladder, which otherwise would have increased in size, and made the patients the subjects of a serious operation. If I remember rightly, he extracted as many as eighty stones, of various sizes, from the first or second patient to whom he applied this mode of treatment. I have also employed this method with success in many

instances. My first patient was a gentleman who had a sac containing a number of small calculi in the prostate gland. These I extracted with great facility — sometimes three or four in the same day. When this sac was emptied, I found that there were also a number of stones in the bladder, and these I extracted, one after another, in the same manner — three or four score in all. This gentleman lived in the country; and what I have now mentioned was accomplished when he visited London, in two successive years. But the case was a complicated one, and I shall have occasion to refer to it again when I call your attention to the subject of prostatic calculi. All that I need say of it further at present, is, that a year after the last calculus was extracted by the forceps, the patient died of extensive disease of the bladder and kidneys.

But these forceps are capable of seizing a calculus of very considerable dimensions; and not only capable of seizing, but of extracting it, by a slight modification of the operation. The neck of the bladder admits easily of a great degree of dilatation. It is not so with the urethra. An elderly gentleman consulted me with symptoms of stone in the bladder; but the symptoms were not severe, and I was led to believe that the stone was probably small enough to be extracted by means of Weiss's forceps. The first time that I introduced them into the bladder I seized the stone. I drew it readily through the neck of the bladder; but I found from the expanded state

of the forceps that it was much larger than any of those which I had previously extracted in this manner. When I had drawn the stone some way into the urethra, it was evidently impossible to draw it further without lacerating the membrane of the canal. But I could feel the stone distinctly in the perineum. Nothing appeared more simple than the removal of it by means of an incision made behind the scrotum. Holding the handle of the forceps with one hand, and in such a manner as to cause the stone to project in the perineum, with a scalpel in the other hand, I divided the skin and other soft parts over it. The stone was easily disengaged from the blades of the forceps, and taken out through the wound. Some months afterwards the patient came to me again, and I found another considerable stone in the bladder, which I removed in the same manner. You see, in this preparation, the two calculi which I have just mentioned. The largest of them is seven-eighths of an inch in one diameter, and six-eighths in another; and the other is only a very little smaller, the difference between the two being scarcely perceptible to the eye.

The wound in the perineum in each of these cases healed very readily. But in another case I did what, with the experience which I now have, I shall be inclined, if possible, to avoid in future. I extracted the stone which I now shew you from the bladder with the urethra forceps, and drew it with some difficulty into the urethra, as far forward as that part of it which is imme-

diately before the scrotum. In this situation I made an incision on it, and having disengaged it from the forceps, took it out through the wound. This was accomplished easily enough; but there was a good deal of trouble in healing the wound, in consequence of the urine dribbling into the cellular membrane of the scrotum, and producing a succession of troublesome abscesses.

I cannot doubt that this method of extracting calculi with the urethra forceps admits of much further improvement; and the modification of the operation, which I am about to describe, may probably be applied with much advantage to many cases.

I have already explained to you, that if you introduce a gum catheter, and draw off the contents of the bladder, where there is a small calculus, it very frequently happens, as the last portion of the urine flows, that the calculus is thrown down, as it were, on the end of the instrument. Then, it occurred to me, that if a catheter could be made to open like a pair of forceps, the calculus would very probably fall into it; that if it did not do so at one time, it would do so at another time, and that thus it might be extracted without searching and irritating the bladder — with little or no pain to the patient, and little or no trouble to the surgeon. With these impressions on my mind, I contrived the instrument which I now shew you. It is a pair of forceps with two blades, the opposite surfaces of which are made rough, like a

rasp or coarse file. They open by withdrawing a tube, which encloses them, on the principle of one kind of bullet forceps, or of the French lithontriptic instrument. But the forceps are themselves a hollow tube, so that whenever the blades are separated, they answer the purpose of a catheter; allowing the urine to flow out of the bladder. Soon after this instrument was constructed, I had an opportunity of employing it. A gentleman consulted me with slight irritation of the bladder. I examined the bladder with an iron sound, and detected in it a very small calculus. I then dilated the urethra to its utmost extent. This was easily accomplished, but the calculus did not come away. I introduced Weiss's original urethra forceps, but the stone eluded my search. I therefore introduced my new forceps, the bladder being full of urine; and the blades being expanded, of course the urine flowed. When the bladder was empty, I endeavoured to close the forceps, but found that I could not do it. In fact, the stone was seized, and it was easily removed. It was of the size of a large pea; and the patient suffered not the smallest inconvenience from the operation. Since then I have succeeded in another case in extracting a stone by means of these forceps with equal facility. The stone in this last case was of the size of a common hazel-nut.

It is not difficult to acquire the habit of using the urethra forceps. The principal thing to be attended to is, that *they are never to be opened*

in a contracted or empty bladder, and that they are to be closed immediately after the urine has escaped. If you do not attend to these precautions, you will run the risk of inducing hæmorrhage from the neck of the bladder, as well as inflammation of its mucous membrane.

The methods which I have hitherto explained are not applicable to calculi above a certain magnitude. We must resort to other expedients if we would relieve our patients of those which are of larger dimensions.

It has been observed by chemists that lithic acid admits of being dissolved by a strong solution of pure or caustic alkali. It has been also observed that calculi composed of the phosphates are acted on by the mineral acids; and it may not unreasonably be entertained as a question, how far those changes which take place out of the body may be produced while the calculus is still in the bladder of a living person.

This problem, of the solution of calculi by chemical agents, has occupied the minds of many individuals both in past and present times. It has been proposed by some to administer the menstruum by the mouth, so that it might be conveyed into the urine by the usual channels; and by others to inject it into the bladder, by means of a catheter. This subject is one of great interest, and well deserves our serious and unprejudiced consideration.

I fear that those who have expected by these

methods to relieve patients of lithic acid calculi have much over-rated the effects of alkaline *lixivia* on them. The fact is, that although alkalies certainly are capable of acting on this kind of calculus, their action, except when employed in a very concentrated form, is so inconsiderable, as to amount to almost nothing. Neither the stomach nor the bladder are capable of bearing the quantity of alkali which is necessary to the production of the desired effect; and even if they were, it would be impossible to maintain so constant a supply of the alkali as would be necessary to the destruction of a calculus of even moderate dimensions. Mr. Brande, moreover, has observed that the carbonates of potash and soda have no action on lithic acid; that they are incapable of dissolving it, and that, if the pure alkali be taken by the mouth, it never reaches the bladder in this state, but only in that of a carbonate: and here, then, is an insuperable objection to all the attempts to dissolve lithic acid calculi by means of alkalies taken into the stomach. When there is a lithic acid calculus in the bladder, and the lithic acid diathesis prevails in the system, the first effect of alkalies taken into the stomach is to render the urine neutral; thus preventing the further increase of the calculus. So far, then, alkalies are useful. But if they are administered in still larger quantity, so as to render the urine alkaline, the phosphates begin to be deposited. The calculus continues to grow even more rapidly than before; but its composition is al-

tered, and layers of the triple phosphate are deposited on the lithic acid nucleus. Such is the view of the subject taken by Mr. Brande; and if you read what he has said on the subject in one of his papers on calculi (I believe the last), you will, if I am not much mistaken, be satisfied that it is well founded.

But you will, not improbably, hear of cases in which it has been supposed that, under the use of alkaline medicines, calculi have come away by the urethra, broken down into fragments; and you will hear of others in which, under the same mode of treatment, the symptoms dependent on the calculus have vanished; and this circumstance has in itself been regarded as a sufficient proof of the calculus having been dissolved, although no calculous matter had ever been discovered in the urine. But none of these cases will stand the test of critical enquiry. In those of the first order, the supposed fragments are, in reality, not the old stone dissolved, but a new formation. They are actually generated by the alkalies; the mischievous consequence of the indiscreet and unscientific exhibition of these remedies. Such cases, instead of adding to the laurels of surgery, only shew how this important and useful art may become a source of evil instead of good, when it falls into the hands of the inconsiderate or ignorant. With respect to the cases of the second order, you will observe, that, when you come to investigate them, you never find that the symptoms have altogether and com-

pletely subsided. There has been some diminution of them, but that is all; and various circumstances will explain whatever amendment has taken place. Thus a stone may become encysted, which was not so originally. So it was, probably, in a case, the history of which I related in a former Lecture. Another remarkable example of this occurrence presented itself to Sir Astley Cooper and myself. A gentleman, about sixty-six years of age, consulted us concerning a frequent desire to make water, attended with pain and other symptoms, such as a stone in the bladder might occasion. We had a suspicion that there was a stone in the bladder, and had purposed to examine the bladder with a sound. Previously to this being done, however, the symptoms began to subside, so that the patient suffered comparatively little inconvenience from them. About a year and a half afterwards he died of another, and wholly different, disease. On examining the body after death, we found, at the fundus of the bladder, a cyst, formed by the protrusion of the mucous membrane between the muscular fibres; and in this cyst was lodged a calculus of the size of a hazel-nut, of which it seemed impossible to doubt that it had been the cause of all the distress which the patient had suffered formerly. Now let us suppose that, in such a case as this, the existence of the stone having been ascertained, the patient had gone through a course of alkaline medicine; would it not have been supposed by the patient and his

friends that the alkalies had produced a cure?—and if the real circumstances had not been disclosed by a *post mortem* examination, would not the case have been handed down, as affording an example of the great influence of alkalies over calculous disorders?

Another circumstance may occasion a considerable abatement of the symptoms of stone in the bladder, namely, an enlargement of the prostate gland. The more urgent symptoms produced by a calculus arise from it coming in contact with the internal orifice of the urethra. But where the prostate is enlarged, so as to form a tumor projecting into the bladder, this is in great measure prevented. The calculus becomes lodged, as it were, in the hollow behind the tumor, and is thus prevented falling down on the neck of the bladder: and if the enlargement of the prostate supervenes on a stone in the bladder, the symptoms of the latter disease are likely to be, in no inconsiderable degree, relieved. Sir Everard Home has published an account of two cases, the circumstances of which are, as it would seem, to be explained in this manner. These cases are especially interesting on this account,—that both of them had been published while the patients were yet alive, in proof of the efficacy of solvents. In each of them, the stones which were supposed to have been dissolved, were found in the bladder, after death, apparently unaltered.

The mineral acids undoubtedly exercise a

much greater chemical action on calculi composed of the phosphates than alkalies do on those which are composed of lithic acid. It is not, indeed, possible to exhibit them by the mouth in such quantity as to render the urine sufficiently acid for the purposes of a solvent; but we have no right to conclude from thence that they may not produce this effect if injected into the bladder by the urethra.

It is now some years since I began a series of experiments upon this subject. I injected into the bladder a solution of nitric acid in distilled water, in the proportion of one minim of the former to an ounce of the latter. As no inconvenience followed, I increased the quantity of nitric acid, until two minims, and sometimes two minims and a half, were contained in each ounce of the injection. The result was the same. Not only the patients did not suffer, but, where chronic inflammation of the bladder was present, they experienced considerable relief of all their symptoms; the desire to make water becoming less frequent, and, in particular, the secretion of the ropy adhesive mucus from the coats of the bladder being very much diminished. I next endeavoured to ascertain to what extent a solution of this strength was capable of acting on a calculus of the mixed phosphates. The change produced was sufficiently obvious, especially when the solution was made to pass over the calculus in a stream for a considerable time. It gradually diminished in

size, and at last began to be broken down into minute fragments. About this time, an elderly gentleman consulted me under the following circumstances. — He had laboured under stricture of the urethra for a great number of years. The stricture had been much neglected; and, at last, had produced the usual consequences—disease of the bladder—that is, chronic inflammation of its mucous membrane, and, probably, disease of the kidney also. The patient had an almost incessant desire to void his urine; every attempt to do so was attended with the most excruciating pain; the urine, at the same time, being highly alkaline, offensive to the smell, depositing a large quantity of viscid mucus, with which were blended small particles of phosphate of lime, resembling mortar. He was drinking lime-water, which some one had advised him to take, with great perseverance, and, the more he drank, the more he suffered, and the more mortar came away. This, he thought, was all as it ought to be; and he expressed himself, as patients often do under the same circumstances, saying that, no doubt, it was better that he should get rid of the gravel, and that the lime-water must be doing him good. However, not being so well satisfied on this point as my patient seemed to be, I advised him to leave off the lime-water. The symptoms were immediately altered for the better; but still they were bad enough. The next step was to introduce a catheter, and afterwards a sound, into the bladder. When this was

accomplished, which, on account of the contracted state of the urethra, was at first not without some difficulty, I at once detected a calculus. Here, then, was a case of calculus manifestly composed of the phosphates, arising out of a diseased state of the bladder, and a case in which the danger of an operation would have been so great, that no prudent surgeon would think himself justified in recommending it to the patient. Dr. Prout was consulted at my request, and he agreed with me in thinking, that, under the peculiar circumstances of the case, it was one well fitted for the experiment which I had proposed with the nitric acid injection.

For this purpose I procured the catheter which I now shew you. It is made of the purest gold which can be worked. It has a double channel, which are separated from each other by a longitudinal septum running the whole length of the instrument. Each channel terminates by a distinct tube at the handle, and has a separate eye, or opening, at the other end of the catheter. By means of this instrument, you will observe that a liquid may be injected into the bladder, entering it by one passage, and flowing out of it by the other, so that there may be a current through the bladder, without that organ being inconveniently distended. I had contrived a complicated apparatus for the purpose of making the injection; but I was afterwards led to prefer the simpler contrivance of an elastic gum-bottle, having a stop-cock and an elastic

gum tube attached to it. At first I washed out the bladder with some distilled water, to get rid of the mucus which was lodged in it. Then I injected the solution of nitric acid very slowly, using the same liquid over and over again several times. Always after the operation was performed, the liquid which had been employed as an injection was tested by the addition of a *highly concentrated* solution of pure ammonia; and it was always found, that, if the ammonia was added in a sufficient, but not too large a quantity, the phosphates were precipitated in abundance. The patient suffered no material inconvenience from this operation. It was continued sometimes for fifteen minutes, sometimes for half an hour, and repeated, according to circumstances, once in two, three, or four days. At last, in making water, the patient voided these two small calculi, composed of the phosphate of lime, with a small proportion of the triple phosphate. It was impossible to doubt that they had been acted on, and partly dissolved, by the acid injection, and that they had, at last, come away by the urethra, in consequence of their having been thus reduced in size. For some time after this occurred, the patient was in a state of comparative ease. He had still symptoms of stricture of the urethra and diseased bladder, but he was free from the more urgent symptoms under which he had laboured formerly. By degrees, however, these symptoms began to recur; and I have no doubt that there was a fresh formation of calculi, produced chiefly,

as was the case with the former ones, by the diseased state of the bladder. If he had remained in London, I should probably have been able to have given him some further relief, by repeating and continuing the use of the injection. But he went into the country, where, having been for a long time in a very bad state of general health, he at last died, as I was informed, of some disease not immediately connected with that on account of which I had been consulted.

Since the occurrence of this case, I have from time to time, as opportunities presented themselves, endeavoured to follow up the investigation; and I have contrived a more complete apparatus for the purpose of making the injection. I hope, at some future period, that the observations which I have made may prove worthy of being presented in a more distinct form to the notice of the profession. At present, I shall content myself with stating, that the facts with which I have hitherto become acquainted appear to me to justify the following conclusions:—

1. That where the mucous membrane is affected with chronic inflammation, the urine depositing a viscid alkaline mucus, a most beneficial change may frequently be produced in the condition of the bladder by the injection of a weak solution of nitric acid into it.

2. That a calculus, composed externally of the phosphates, may be acted on by this injection so as to become gradually reduced in size, while it is still in the bladder of a living person.

3. That there is reason to believe that calculi, composed throughout of the mixed phosphates, such as are met with in some cases of diseased prostate gland and bladder, are capable of being entirely dissolved under this mode of treatment.

It is especially in cases of this last description that the nitric acid injection is likely to be employed with advantage; and let us not forget that there are no cases for which an improved method of treatment is more wanted than for these. Hitherto they have been the opprobrium of surgery, being unfitted, except it be in a few rare cases, not only for the common operation of lithotomy, but also for the new lithontriptic operation which is practised in France by M. Civiale, and by Baron Hourteloup in this country.

LECTURE XI.

OPERATION OF LITHOTOMY.

I PROCEED to describe the method of extracting a calculus by means of an incision of the bladder. This is what is commonly called the operation of lithotomy. I shall draw your attention to the operation on the male sex first, and afterwards to that on the female.

You may make an opening into the bladder at its fundus; and this is what is meant when we speak of the high operation. You may also make the opening at the neck of the bladder. The experience of the great majority of surgeons, from the time of lithotomy having been first practised to the present day, is in favour of the latter method of operating; but as to the exact mode of making the incision at the neck of the bladder, there has been, and still is, a considerable variety of opinion. I shall explain to you what I am led to believe to be the most eligible method of performing the operation; endeavouring to establish, at the same time, the principles on which it is to be conducted; the observance of which will enable you to do all that belongs

to human means towards the safety of your patient.

In order that the object of the operation may be clearly understood by those who have not yet studied the subject, I am accustomed to explain it in the following manner: —

A small calculus may be voided by the urethra without an operation of any kind. A larger calculus is prevented coming away, because the urethra is too small to receive it. The obvious remedy for this is to dilate the urethra, to make it wider; and if it cannot be sufficiently dilated by the bougie, it must be dilated by the knife. But it is unnecessary to divide the urethra for this purpose through its whole extent. It is much easier to cut down on the urethra where it lies in the perineum, and dilate the posterior portion of it (which includes what is called the membranous part, and also that which lies imbedded in the prostate gland). The stone may then be extracted through the wound in the perineum, the greater part of the urethra remaining untouched and unhurt.

In performing this operation there are some things to be especially kept in view.

1st. The external incisions are to be made in such a manner as that there may be a sufficient space for the easy extraction of the calculus. Such a space does not exist between the two rami of the pubes, in the upper part of the perineum. Neither will it be obtained by an incision made in a vertical direction, in the line of

the raphe of the perineum, unless, indeed, it be carried so low down as to divide the anus and a portion of the rectum. But if the incision be made obliquely, beginning at the raphe of the perineum, and extending laterally between the anus and the tuberosity of the ischium, there will be room, as far as the external parts are concerned, for the extraction of a very large calculus. Such an incision will manifestly answer the intended purpose, at the same time that it is not liable to the objections which may be urged against the incision made in the course of the raphe, and extending into the rectum.

2dly. The incisions are to be made so as to avoid any considerable and dangerous hæmorrhage. It is idle to say that the occurrence of such a hæmorrhage is an hypothetical evil. Even in a young person, with a small mass of substance in the perineum, there are vessels which may bleed much if divided. But the operation is frequently performed on persons advanced in life, who have a deep perineum, that is, in whom a large quantity of soft parts must be divided before the knife can reach the bladder. The vessels of the perineum are in them large in proportion; and an incision made with the utmost care will sometimes divide vessels which will bleed profusely. On this account, the incisions should not be made of a greater extent than is really necessary; especially in the deep parts of the perineum, where the bleeding vessels are not so readily to be discovered, nor so easily

commanded, as they are near the surface. With the same view the incisions should be low down in the perineum, so that there may be as little risk as possible of wounding the artery of the bulb of the urethra; at the same time that care is taken not to carry them close to the ischium, where the trunk of the internal pudic artery is situated, and where its branches are, of course, of a larger size than at a greater distance from their origin.

3dly. It is, on other accounts, of great consequence that there should be no large incision of the neck of the bladder. The prostate gland is of a firm, dense structure; and when it is divided, the urine passes over the cut surface, without there being any danger of it penetrating into its substance, or into the neighbouring textures. But on the outside of the prostate, and neck of the bladder, is a loose cellular membrane, which, if the urine has access to it, may become infiltrated with it to a very great extent; and which, thus infiltrated, is likely to be rendered the seat of extensive inflammation, sloughing, and abscesses. It is important, therefore, that we should avoid carrying the incision beyond the boundaries of the prostate into this loose cellular membrane. It is true, that, if the stone which is to be extracted be beyond a certain magnitude, this cannot be avoided; but it may be avoided otherwise. Not only a small stone, but one considerably above the average size, may be taken out of the bladder, through a wound which

does not extend beyond the limits which I have mentioned; and in many instances where, from the size of the stone, this cannot be accomplished by means of an incision confined to one side of the prostate, the object may be attained by making a double section, and dividing the prostate on both sides.

The dangers attendant on an extensive wound of the neck of the bladder, penetrating beyond the margin of the prostate, are not merely theoretical. As long ago as the year 1810, the case, which I am about to mention, first opened my eyes to the ill consequences arising from a communication being made between the cavity of the bladder and the loose cellular membrane in which it is enveloped. I was present at an operation of lithotomy, performed by a very experienced and skilful surgeon. There seemed to be no difficulty in its performance, and the forceps were introduced only once into the bladder; but the bladder (as I suppose) was in a contracted state, and the surgeon, in opening the forceps, observed a resistance, which suddenly gave way as if a ligature had been broken. In the evening the patient was apparently well, but during the night he had no sleep, and he complained exceedingly of hunger. On the following day, towards the afternoon, his abdomen became a good deal distended, and the pulse rose to 150 in a minute. He was low and desponding; his hands were cold, and his respiration frequent. During the following night,

(the second from the operation) these symptoms became aggravated. He had still no sleep; the pulse was more rapid and feeble; and on the following morning he died.

It fell to my lot to examine the body after death. In doing so I found that the mucous membrane and muscular tunic of the bladder had been ruptured for about the extent of three quarters of an inch. The rupture was situated on the left side, just anteriorly to the rectum, and it, of course, extended into the cellular membrane on the outside of the bladder. The cellular membrane in the neighbourhood of the rupture, and for some distance upwards in the course of the ureter, had the appearance of being infiltrated with urine; it was inflamed and sloughy; and at the lower part, close to the bladder, its cells were occupied by a small quantity of pus.

In the year 1816 I met with the following case, which confirmed the suspicions which the preceding case had excited in my mind. A little boy, about a year old, was admitted into the hospital, labouring under stone in the bladder. I performed the operation for its extraction, making the incision of the prostate with a common scalpel. Having introduced my finger into the bladder, I felt a very large stone, and at the same time found that I had made a very small incision. On this I introduced a probe-pointed bistoury, and dilated the wound, as I thought, sufficiently for the easy extraction of

the stone. On the following day the pulse was rapid; the patient was low and depressed; and from this time he continued to sink until he died, on the third day after the operation. On dissection, I found that the wound at the neck of the bladder had extended beyond the boundaries of the prostate gland. The cellular membrane in the neighbourhood had all the appearance of having been infiltrated with urine. It was in part inflamed, and in part in a state of slough, being converted into a substance resembling wet tow. There was nothing else to account for the patient's death.

Some time after the occurrence of this last case, I had the opportunity of perusing Scarpa's Memoir on the Cutting Gorget, and was gratified to find that the views which I had been led to form corresponded to those of this distinguished surgeon. That these views are correct, I cannot at this moment entertain the smallest doubt. They are supported by other cases which have fallen under my observation, in which the patients manifestly died from inflammation and sloughing of the loose cellular membrane surrounding the prostate and neck of the bladder. If any one who has had much experience in lithotomy will look back at the cases which he has met with, in which patients have died after the operation, he will, if I am not much mistaken, find that what I have just mentioned will explain many things which would be otherwise inexplicable; in particular, he will find an easy solution of the great

danger which attends the extraction of very large calculi. He will also be enabled to comprehend wherefore it is that patients, on whom the operation is performed with the greatest apparent dexterity and ease, and in the shortest possible space of time, sometimes die in the course of two or three days after the operation; while others, in whom the stone appears to have been extracted with difficulty, recover without any unfavourable symptoms.

I proceed next to explain to you in detail the various steps of the operation. The first, as I have already stated, is the making an incision into the urethra where it lies in the perineum; the second is the dilating, or dividing that canal where it is surrounded by the prostate. To facilitate the accomplishment of these objects, it is convenient to begin with introducing into the urethra this solid steel instrument, which we call a staff. It is of the figure of a sound; from which, however, it differs; first, in the handle, which, instead of being smooth and polished, is made rough, in order that it may be more firmly and steadily held; secondly, in having a groove, like that of a director, on its convex side. It is, in fact, a director, and intended to answer precisely the same purpose. The staffs sold by the instrument-makers are generally of too small a size. They should be as large as the urethra will easily admit without being painfully stretched. A large staff is more easily felt in the perineum than a small one, and it admits, of course,

of a deeper and wider groove. The groove ought to become gradually shallower just before it terminates at the extremity of the instrument, in order that the point may be neatly rounded off. The edges of the groove ought to be carefully rounded off also. Attention to these circumstances in the construction of the staff, renders its introduction more easy. I generally begin the operation with introducing the staff into the bladder, merely because it is, on the whole, more readily managed when the patient is standing erect, than after he is placed on the table.

The next thing is to secure the patient in a proper posture, with the perineum exposed. About two feet six inches is a convenient height for the table. The patient should be placed on it lying on his back, supported by pillows, with his shoulders somewhat elevated. He should be directed to grasp the outside of each foot with the hand of the same side; and then the hand and foot are to be bound together by several turns of these bandages, which we call lithotomy garters. If the patient be corpulent, he probably will not be able to grasp his feet, and he must in that case grasp his ankles instead. Besides the lithotomy garters, it is convenient to apply another bandage — the neck strap, which is thrown over the back of the neck, and passed under each ham. These bandages are not employed with a view to prevent the patient struggling, as persons out of the profession gene-

rally suppose, but solely for the purpose already mentioned, namely, to keep him in a convenient posture, with the perineum properly exposed. Thus prepared, the patient is drawn towards the end of the table, with the buttocks rather projecting over it.

Several assistants are required, one to support the patient on each side, holding his feet, hands, and knees, and keeping the lower limbs well asunder; a third to give you the instruments, in the order in which you want them; and a fourth to hold the handle of the staff. It is also convenient, though by no means necessary, to have another assistant, to support the patient's shoulders. Your assistant, who holds the staff, may stand on either side; but it is usual for him to stand on the patient's left side, in order that he may take the handle of the staff in his right hand.

The surgeon himself should be seated on a stool before the patient. He is first to attend to the position of the staff, taking care that it is held nearly perpendicularly; the handle of it being, however, a little inclined towards the patient's right groin. This causes the convexity of the instrument to project slightly on the left side of the perineum.

In the first part of the operation your attention is to be directed to the staff. You are to feel it with your left hand, and the knife held in your right hand is to be directed towards it. It is a sure guide; following which, you can never err,

even in the deepest perineum. On the other hand, if you lose sight of it, you are cutting in the perineum, as it were, at random; you divide parts which you ought not to divide; especially you are in danger of carrying your incisions too near to the ramus of the ischium, where the arterial branches of the internal pudic artery are of a larger size than in the centre of the perineum, and therefore more liable to bleed. I have seen some surgeons endeavour to introduce the point of the double-edged scalpel into the groove of the staff at the first incision. But I caution you against this, as a great error in the operation; except, indeed, it be in the case of a young and very lean subject. Where there is any quantity of fat in the perineum, or any thing even distantly approaching to what we call a deep perineum, if you attempt to cut at once into the groove of the staff, the result is, that you open the urethra too far forwards; you divide the *corpus spongiosum* of the penis, which need not in reality be divided at all: and you are then certain of wounding the artery of the bulb of the urethra, which otherwise is, in most instances, avoided. Another inconvenience which attends on this method of proceeding is, that the wound being too near to the scrotum, the cellular membrane of it is in danger of being infiltrated with blood; and another still is, that a greater mass of substance is left to be divided, when you continue the incision into the bladder, than there

would have been if you had cut into the urethra farther back in the first instance.

I say, then, let the opening in the urethra be made deep in the perineum, behind the bulb, and as near as can be to the prostate. Place the thumb of your left hand on the skin over the staff; and in a man of ordinary size, about an inch and a quarter before the anus. Begin your incision immediately below this, on the left side of the raphe, and continue it backwards and towards the left side, into the space between the anus and the tuberosity of the left ischium. Here you may cut freely: you can injure nothing of consequence. Then feel for the staff in the wound; direct the point of your knife towards it, and carefully cut into the groove, where it lies in the membranous part of the urethra. All these incisions are, you will observe, made low down the perineum, that is, near to the rectum. I have already given you what I conceive to be sufficient reasons for avoiding incisions in the upper part of the perineum. I may add another, namely, that if the external part of the wound be in the lower part of the perineum, there is a depending orifice for the free discharge of the urine after the operation, which there would not be otherwise. There is also a great authority in favour of this mode of proceeding. Cheselden made his incisions in the way which I have mentioned, as is proved by the anxiety which he evinced to avoid injuring the rectum. Had he done otherwise, it would never have entered

into his contemplation that the rectum was in danger.

The next step of the operation is the continuance of the incision along the posterior part of the urethra, and the dilatation of the neck of the bladder. Some recommend this to be accomplished by means of the common scalpel, with which you have made the external incisions; the point being steadily introduced along the groove of the staff, with the edge turned outwards, so as to divide the left side of the prostate. This was Cheselden's method of operating. I draw this conclusion from Cheselden's own account of his operation, not from the absurd statement published by his cotemporary, Dr. Douglas, who evidently understood nothing of the matter, and indeed describes an operation which it is next to impossible to perform. But after having incised the prostate and neck of the bladder, Cheselden introduced the instrument which I now shew you, the blunt gorget, so as to dilate the wound still further, answering at the same time the purpose of a conductor for the forceps; and, as far as I can learn, this method was followed generally by the English surgeons up to the time of Sir Cæsar Hawkins. This celebrated operator, who exercised his skill, and acquired his reputation, within the walls of our hospital, caused one side of the gorget to be ground to a sharp edge, and thus converted the blunt into a cutting gorget. The cutting gorget of Sir Cæsar Hawkins (and all those that

have been since invented are but modifications of it) was intended to supersede the use of the knife in opening the neck of the bladder, at the same time that it answered the purpose of a blunt gorget in other respects. It would be presumptuous in me to say that the cutting gorget is not a good instrument, when it has been employed, not only by many of our more distinguished, but by some of our most successful lithotomists. Nevertheless I cannot but think that there are some considerable objections to it. The incision is made as it is being thrust into the bladder. In consequence of the thick wedge-like form of the instrument, the prostate, and especially a hard and enlarged prostate, offers to it considerable resistance. A certain quantity of force is necessary for its introduction; and if that force be not well applied, the beak may slip out of the groove of the staff into the space between the bladder and rectum, — an accident which is too surely followed by the death of the patient. Now I know that such an accident ought not to happen; but I also know that I have seen it happen to a very experienced and dexterous lithotomist. There is, of course, a still greater chance of its happening to an inexperienced lithotomist (and all are inexperienced in the first instance). These considerations lead me to recommend you not to begin with the cutting gorget: you may adopt it, if you please, afterwards. For my own part, although I have very frequently used the cutting

gorget, I generally make the incision of the prostate with the knife which I now shew you. You will observe that the blade is broad enough to divide a considerable portion of the prostate, as it enters the bladder, without its being necessary to increase the size of the incision by cutting laterally afterwards; and that, instead of a sharp point, it terminates in a beak, fitted to the groove of the staff. In ordinary cases, a knife of this kind, with a single cutting edge, is sufficient; but in cases of very large calculi, there are good reasons for dividing both sides of the prostate. There is no objection to this being done, that I can discover; and for such cases I have been for some time in the habit of using this double-edged knife, with a beak projecting from its centre.

Having made the opening into the membranous part of the urethra, you are to insert the beak of the beaked knife into the groove of the staff. You then take the handle of the staff into your left hand, depressing it at the same time. You depress your right hand also, so that the handle of the knife, which you hold in it, lies in the lower part of the external wound. You are now to push the knife along the groove of the staff into the bladder, with its cutting edge inclined a little downwards towards the ramus of the ischium, if you use a single-edged knife; but holding it horizontally, if you use one with a double edge. Let this be done slowly, cautiously, taking care that you do not lose the feeling of the

beak sliding over the smooth surface of the staff for a single instant. Generally, as the knife enters the bladder, a few drops of urine escape, but never any large quantity. This being accomplished, you are to withdraw the knife along the groove of the staff in the same line in which you introduced it. Never cut with it laterally, except you find it afterwards absolutely necessary to do so, on account of the large size of the stone; for in cutting laterally, you will find it difficult to measure exactly the extent of your incision; and you may endanger your patient's life in consequence of your dividing the parts beyond the boundaries of the prostate.

The next step of the operation is to introduce your finger, directed by the staff, into the bladder so that you may feel the parts which are divided, and determine whether the incision is properly made. If you operate on a child, or on a young and thin person, you may then at once introduce the forceps into the bladder. But if you operate on a full-grown person, and especially on one having a deep perineum, it will be prudent for you first to introduce this instrument, which we call a blunt gorget, previously to the use of the forceps. The blunt gorget is, as you perceive, an oblong plate of steel, turned up at the edges, so as to present a concave surface above, and a convex surface below. The handle is inclined downwards; and that extremity, which is opposite to the handle, gradually becomes narrower, and terminates in a beak similar to that of the

lithotomy knife. The surgeon takes the blunt gorget in his right hand, and inserts the beak in the groove of the staff; then, holding the handle of the staff in his left hand, and depressing it at the same time, he carefully introduces the gorget into the bladder. Having done so, he withdraws the staff, and leaves the gorget in the wound.

The gorget is intended to answer the purpose of a director for the forceps. But it answers another purpose also; it is a dilator of the wound. The knife divides only a portion of the prostate. The gorget splits the remainder as far as its breadth allows it to do so. Do not for an instant suppose that this is any rude or violent proceeding. It is far otherwise. The incision of the prostate having been begun by the knife, the extension of it by means of the blunt gorget is accomplished with the greatest ease. If you perform the operation on the dead body in the way which I have described, and dissect the parts afterwards, you will distinguish very readily the clean smooth surface made by the cut of the knife, from the fibrous, or striated surface, made by the splitting of the gorget. You will ask, Why not make such a division of the parts by cutting laterally with the knife? Why prefer the dilatation of the wound by the blunt gorget? My answer is, that the separation of the parts with the latter instrument causes no hæmorrhage; and that it ceases as soon as it reaches the margin of the prostate; that is, as soon as it

reaches the condensed cellular membrane, which forms what may be called its capsule.

Before explaining the use of the lithotomy forceps, I must shew you their construction. One of the handles terminates in a ring, the other in a loop. The blades become broader towards the extremity; their opposite surfaces are concave, and armed with small pointed projections, or teeth. When closed as far as they can be closed, the ends do not exactly come in contact. Thus they are well fitted to hold the stone which they have seized, at the same time that, if the stone be not seized, it is impossible for them to pinch the mucous membrane of the bladder. This particular forceps is made according to the pattern of those which Cheselden employed on most occasions, as described by Douglas, and you will find them very generally useful. You must not, however, rely on these alone: you must have forceps which are longer and larger: others much smaller, especially for operations on children. You should be provided, also, with curved forceps, to be used where the stone lies in the hollow behind an enlarged prostate gland.

The surgeon, then, holding the handle of the blunt gorget with the left hand, introduces the forceps with his right, along the concave surface of the gorget, into the bladder. This is to be done cautiously, and without violence. But it is to be observed, nevertheless, that the forceps always experience a certain degree of resistance,

and that some force is necessary to make them enter the bladder. You know when they have entered by the resistance ceasing, and, in many cases, by a gush of urine taking place at the time. In a deep perineum the forceps have to penetrate to a great depth before they arrive at the bladder. This is one of the sources of difficulty and doubt to a young surgeon, who is apt to think that the forceps must have actually entered the bladder, when they have, in reality, penetrated no farther than the prostate. The forceps having been introduced, the gorget is to be withdrawn.

The surgeon is not to open and close the forceps at random. He is to use them first as a sound, exploring the different parts of the bladder, until he has ascertained where the stone lies. The discovery of the stone will be very much facilitated by the introduction of the finger along the groove of the staff previously to the introduction of the blunt gorget; at least in most instances. In a case of enlarged prostate and deep perineum, where the finger will not reach the bladder, this mode of examination is, of course, of no avail. The stone being touched by the forceps, the blades are to be opened upon it, and the stone is, in general, readily grasped. I have already mentioned a case in which the muscular coat of the bladder was ruptured in consequence of the surgeon too forcibly and hastily opening the forceps; and this will be a lesson to you as to your conduct in this part of

the operation. But I conceive that the danger of such an accident as this is not the same in all cases. In some instances, when you begin the operation, the bladder is distended with urine; then, when the instruments enter it, the urine rushes out, not impelled by muscular action, but by its own gravity, and the pressure of the viscera. Under these circumstances, when you introduce your finger into the bladder, you find the muscular tunic relaxed, with the mucous membrane hanging in folds; and, in consequence, they are not likely to be ruptured. In other instances, the patient voids his urine immediately before the operation, or, perhaps, during the introduction of the staff. Here, the urine, having been made to flow by the patient's own efforts, the muscular tunic is contracted: it offers a considerable resistance to the opening of the forceps, and is liable to be ruptured, if they are opened rudely and incautiously. It sometimes happens that a small stone lies, as it were, concealed in some part of the bladder, perhaps beneath a fold of the mucous membrane, so that you cannot easily bring the forceps in contact with it. You will then frequently succeed in seizing it in the following manner:—Expand the forceps carefully, until the blades are widely separated from each other, holding them at the same time in such a position as that the blades open horizontally. This dislodges the stone, and causes it to fall to the lower surface of the bladder; and then, as you close the forceps,

you find that you have seized it. In other cases, where there is a tumor at the neck of the bladder, caused by an enlargement of the prostate gland, the stone is liable to be lodged behind the projection. You feel the stone; but the forceps slide over its surface, and do not grasp it. It is in such a case as this that the curved forceps are useful, which are capable of dipping into the hollow behind the prostate. Under these circumstances, you may also find it useful to introduce the finger into the rectum, and raise the bladder, by means of it, towards the pubes. It is evident, however, that this expedient can be of no use, except where the bladder is within reach of the finger, which it rarely is in a case of enlarged prostate.

The next thing to be done is the extraction of the stone with the forceps; and, simple as it may appear to be, there are several things to be attended to in this part of the operation.

The forceps are to be withdrawn from the bladder in the direction of the external wound. For the most part, it is better that the convexity of one blade of the forceps should be turned upwards, and that of the other blade downwards. Attention to this point is especially of consequence in cases where there is an enlarged prostate gland, forming a tumor projecting into the bladder. The smooth convex surface of the blade of the forceps is not interfered with by the projection; whereas, if the forceps are turned in

the other direction, the stone, coming in contact with the tumor, becomes as it were entangled by it, and the extraction of it is rendered difficult. The stone must be grasped with a certain degree of force, otherwise it may escape from the forceps. But, on the other hand, it is important that you should not, in ordinary cases, apply so much force as to crush it, for this will make the operation not only more difficult, and tedious, and painful, but also more dangerous. You should always endeavour to determine, before you proceed to the operation, what is the probable nature of the stone, in order that you may judge how far it is, or is not, likely to be easily broken. The lithic acid calculus is of a very hard texture, and is broken with difficulty. The oxalate of lime calculus is also hard, but it is more brittle than the lithic acid calculus. If the urine be alkaline, without containing the adhesive mucus secreted by the bladder, you know that the external layer is composed of the triple phosphate, and a calculus of this kind is much more easily broken than either of those which have been before mentioned. But the most brittle of all, and that which requires the greatest degree of caution in its extraction, is the fusible calculus, formed partly by the triple phosphate of the urine, and partly by the phosphate of lime, generated by the adhesive mucus secreted by the membrane of the bladder; and the greater the quantity of the adhesive mucus, and the larger the proportion of the phosphate of lime, the more

liable is the calculus to be crushed beneath the pressure of the forceps.

If, having seized the stone, you find that it cannot be readily drawn through the neck of the bladder, you are to bear in mind, that this may be because you have hold of its long diameter. Let it then drop out of the forceps, and endeavour to seize it in a more convenient manner. In some cases you will find it expedient to dilate the wound of the prostate by a second incision. This, however, is never proper, except where you have divided only one side of the prostate in the first instance. You may then introduce a straight probe-pointed bistoury, and make an incision in the opposite or undivided side of the prostate. But this is to be done with the greatest caution. A careless incision may occasion a frightful hæmorrhage, or it may extend beyond the boundaries of the prostate into the cellular texture external to it; and I have already explained to you how much this may endanger the life of the patient.

It is scarcely possible for me to say too much as to the caution necessary in the extraction of a large stone. You must command, not only all your skill, but all your patience; indeed, patience is here the greatest indication of skill. You are to draw out the stone gradually, endeavouring to dilate the parts through which it is to pass, instead of tearing them; and it is astonishing to what an extent this gradual dilatation may be accomplished in the hands of a prudent sur-

geon. I have told you how important it is that you should avoid crushing the stone. But even this rule has its exceptions. A stone may be so large that no degree of gentleness and caution will enable you to extract it entire without extensive laceration of the neck of the bladder, extending into the surrounding cellular membrane; and, under these circumstances, it is the smallest of the two evils that it should be broken into pieces. The fragments are to be extracted one after another, larger or smaller forceps being used, according to circumstances. Some of the smaller fragments may be removed by means of this instrument; a kind of steel spoon, to which we gave the name of a scoop; and the very smallest of all may be washed out of the bladder by introducing the pipe of a syringe into it, and injecting into it a sufficient quantity of tepid water. You are to ascertain, at last, whether the whole of the fragments are extracted, by exploring the cavity of the bladder carefully, by means of this straight sound introduced by the wound, and, in most cases, also by examining it with the finger.

When a fusible calculus, containing a large proportion of the phosphate of lime, is broken, it often happens that some of the fragments are of so small a size that they remain like particles of coarse sand in the bladder, even in spite of all the precautions which you can take at the time of the operation, and further attentions are required. Let the patient recover of the first

effects of the operation: then once or twice daily introduce a catheter by the urethra into the bladder, and inject half a pint of tepid water through it, by means of an elastic gum bottle. The water flowing in by the catheter will flow out by the wound, carrying the particles of sand with it; and thus, at last, the bladder will be emptied of them. In a case of enlarged prostate, indeed, this plan may not answer, as it often happens that the patient is not more able after the operation to empty the bladder by the wound, than he was before to empty it by the natural passage. For these cases you must be provided with a catheter of a large size, having an aperture five times the size of that commonly made, close to the point, on the upper or concave side. The tepid water being injected by the catheter will be discharged by it also, carrying every time some of the small fragments of calculi with it, until none are left in the bladder.

It very rarely happens that you meet with an encysted calculus where you perform the operation of lithotomy. In fact, in the great majority of cases of encysted calculi, the bladder is diseased; so that they are quite unfit for an operation. However, such an event occurs occasionally. A boy, about sixteen years of age, was admitted into the hospital in the year 1816. He had suffered a long time from stone in the bladder. There were these remarkable circumstances in his case; namely, that the stone could sometimes be felt distinctly with the sound, ap-

pearing to be of a large size, while at other times it could not be felt at all; and that, sometimes, when the bladder was empty of urine, it could be perceived distinctly with the finger from the rectum, while at other times, when there was urine in the bladder, it could not be detected at all by this mode of examination. In performing the operation, when I had introduced my finger into the bladder, I could, at first, discover no stone. At last I felt it on the anterior part of the bladder, behind the pubes. It was not lying loose in the cavity of the bladder, but evidently contained in a cyst, communicating with the bladder by a round opening. By means of a probe-pointed bistoury, I carefully dilated the orifice of the cyst, and then, introducing my finger, separated the membrane of it from the stone, until I was enabled to take hold of the stone with the forceps. The stone is preserved among those in our museum. It was not only an encysted stone, but an adhering one also, for it was brought away with a portion of the membranous lining of the cyst closely attached to it. The boy recovered.

After the operation your patient is to return to his bed, where he is to be laid on his back, with his shoulders and loins as much elevated as they can be without inconvenience, so as to make the wound in the perineum as depending as possible. The thighs are to be somewhat elevated by a bolster placed under the hams, and the knees are to be a little asunder. The urine

flows, not through the urethra, but through the wound; and the first, and two or three succeeding, gushes of it usually give the patient a good deal of smarting pain. In many cases, where there has been a deep perineum, and especially where the stone has proved to be of a large size, I have introduced an elastic gum canula through the wound into the bladder, and allowed it to remain for the first two or three days; that is, until there was time for the surrounding parts to become consolidated by inflammation. Such a canula makes an excellent conductor for the urine. It keeps the bladder always empty, and prevents the pain which otherwise is experienced on the first passage of the urine. It prevents also that obstruction to the flow of the urine which sometimes occurs after the operation, in consequence of the wound having become plugged by a coagulum of blood. In cases in which the stone has been of so large a size as to make it probable that, in the extraction of it, the soft parts have been lacerated beyond the boundaries of the prostate, the canula will answer another good purpose, by lessening the danger of the urine becoming effused into the cellular membrane.

In ordinary cases the after treatment is very simple. The wound requires little more than attention to cleanliness; for of what service can applications be to a wound, over which the urine constantly flows? It gradually contracts and granulates; and as it does so, the urine begins

to flow by the urethra. As the wound becomes more contracted, more urine flows by the natural passage; and usually, in about a month from the time of the operation, the function of the urethra is completely restored, and the wound is healed.

In a few cases there may be a reason for applying leeches to the lower part of the abdomen, and in still fewer it may be right to take blood from the arm. Fomentations applied to the belly are sometimes proper also; and to this we may add, the precautions necessary after most other operations, with respect to the functions of the intestines, and the diet.

There are cases, however, in which still further attentions are required. Where the bladder is in a state of chronic inflammation before the operation, secreting adhesive mucus, that inflammation is always aggravated by the necessary introduction of instruments at the time of the operation, and there is always an increased secretion of the adhesive mucus afterwards. Again, in some cases, where those symptoms did not exist previously, they are induced by the operation. Now, under these circumstances, the mucus being liable to deposit the phosphate of lime, and the whole of the urine being rendered alkaline, there is a great liability to a calculous formation, and it will often require much care to prevent this calamity coming a second time upon the patient. Opium, mineral or vegetable acids, and especially the decoction of the *pareira brava*, may be here resorted to with advantage;

— but I need not occupy your time by a detail of the treatment which is proper under these circumstances. It is sufficient for me to refer you to what I said on this subject in the first of my Lectures on Calculous Disorders. In some of these cases, the whole surface of the wound becomes encrusted with a white calculous deposit. Stimulating applications to the surface of it are then likely to be useful, such as a lotion of decoction of bark and tincture of myrrh, solution of the nitrate of silver, or of nitric acid. As by other means the urine is brought into a more healthy condition, these lotions promote the separation of the concretion from the surface of the wound, which then gets into a state to granulate and heal.

LECTURE XII.

ON THE CAUSES OF DEATH AFTER LITHOTOMY.

It is much more agreeable to contemplate the cases in which our art is successful, than those in which it fails; but the study of the latter is not less instructive than that of the former; and I should be guilty of a serious omission if I were to dismiss the subject of lithotomy without endeavouring to explain the circumstances which render the operation hazardous; under which it is likely to shorten the patient's life, instead of leading to his cure.

I have already pointed out what I conceive to be the bad consequences of a too free division of the prostate gland. All that I have been able to observe for many years past, has confirmed me in the opinion, that an incision of the prostate, extending into the loose cellular texture surrounding the neck of the bladder, is replete with danger to the patient. Such a division of parts is never necessary where the calculus is of moderate dimensions; but it cannot be avoided where it is of a very large size; and hence the extraction of stones of this description can never

be accomplished without a great probability of the patient not surviving the operation.

The symptoms, which arise in these cases, are not well marked in the first instance. There is some heat of skin, and generally an absence of perspiration; there is usually an abundant flow of urine through the wound; the pulse, as to frequency, is somewhat above the natural standard; and the patient, although free from suffering, has no disposition to sleep. This state of things continues for twenty-four, or even for forty-eight hours after the operation; then the more characteristic and alarming symptoms shew themselves; the pulse becomes more frequent, rising to 90, 100, and at last to 140 in a minute; the heat of skin becomes still greater; the tongue dry; the countenance anxious. Afterwards, as you count the pulse, you find every now and then a beat weaker than the rest; and then there are complete intermissions. At first the intermissions are not more than one or two in a minute; by degrees they become more frequent, until they occur every third or fourth beat. There is an occasional hiccough; the patient complains of some degree of tenderness in the lower part of the abdomen, especially in the left groin; the belly becomes tympanitic, that is, the stomach and intestines are filled with air; the distension of the belly increases; the hiccoughs are more frequent; the pulse continuing to intermit, becomes weak and fluttering. In some instances the patient retains his understanding

even to the last; while in others he falls into a state of low delirium previous to death. Occasionally, in the progress of such a case, the patient has a severe rigor, and sometimes he complains of a pain in the loins. Where these symptoms begin at an early period, he may die within forty-eight hours from the time of the operation; but in other cases, death may not take place for four or five days, or even for a week. On dissection, you find the cellular membrane round the neck of the bladder, and between the prostate and the rectum, bearing marks of inflammation, infiltrated with lymph and serum; and to a greater or less extent converted into a slough. If death has taken place at an early period, the intestines are found distended with air, and there is a very slight effusion of serum in that part of the peritoneum which descends into the pelvis. But if the patient has laboured under these symptoms for many days before he dies, the peritoneum, where it is reflected from the bladder to the rectum, is seen of a darker colour than natural, and encrusted with lymph; and at a still later period there is the appearance of inflammation, to a greater or less extent, throughout the peritoneum generally. But the peritoneal inflammation is evidently not the primary disease: it is the inflammation and sloughing of the cellular membrane of the pelvis which has induced inflammation of the adjoining portion of that membrane. Something also is to be attributed to the tympanitic disten-

tion of the intestines, which, if continued for a considerable time, is always liable to be attended with tenderness of the abdomen, and some degree of peritonæal inflammation.

It is important that you should not fall into the error of regarding such cases as I have just described, as cases of simple peritonæal inflammation; for the remedies which would be useful in the latter case are injurious here. The abstraction of blood, even the operation of an active purgative, will cause the patient to sink more rapidly, tending only to hasten his death. The proper system to be pursued is the opposite to that of depletion. The patient should take such nutriment as his stomach is capable of digesting. The bowels may be kept open by injections, or by the exhibition of some very gentle purgative; and ammonia, wine, and brandy, are to be administered, when the state of the general system indicates that stimulants are necessary.

Under this kind of treatment I have certainly known two children to recover, who were affected in the manner which I have described. In one of the cases to which I allude, an abscess formed in the neighbourhood of the neck of the bladder, which burst into the wound, and then the symptoms subsided. In the other a slough separated into the rectum, and a fistulous communication remained afterwards between that bowel and the neck of the bladder; but it was of a small size, and pro-

ductive of no serious inconvenience. In adults the chance of recovery is, at any rate, much smaller than in children. Can any thing be done for their assistance in the way of local treatment? Let us consider how it is that the dangerous symptoms arise. There is suppuration and sloughing of the cellular membrane round the neck of the bladder, and the constitution is disturbed, as it is in a case of carbuncle; or, what is still more analogous, as it is in those cases in which there is sloughing of the cellular membrane of the scrotum, in consequence of the effusion of urine arising from the rupture of the urethra behind a stricture. And, in these cases, what is the practice recommended? Do we not divide the soft parts freely over the sloughing cellular membrane; and is not this operation productive of the most signal benefit? Is it possible to resort to any practice corresponding to this, in the cases now under our consideration? There is only one way in which this can be accomplished, namely, by laying the sloughing abscess open into the rectum. I made this experiment in one instance, and I will tell you the result. In September, 1825, I operated on a patient, a man between fifty and sixty years of age, labouring under stone in the bladder, in St. George's Hospital. The stone was extracted without the smallest difficulty. But I performed the operation with what is called Mr. Blizard's lithotomy knife. This is a long, narrow, straight, probe-pointed bistoury, and you must cut with

it laterally, in order that you may divide the prostate, so that it is difficult to determine the exact extent of the incision. Immediately after the operation, I had some misgivings, and was led to fear that I had made the incision to such an extent as to penetrate beyond the boundaries of the prostate. At first, indeed, the patient seemed to be going on as well as possible; but, in about forty-eight hours from the time of the operation, some unfavourable symptoms began to shew themselves. On the third day after the operation the countenance was anxious, the skin hot, and the pulse occasionally intermitted. On the following day (the fourth) the pulse intermitted once in fifteen beats; the skin was hot and dry, and the abdomen began to be tense and swollen. I could not doubt that those symptoms existed which I had known to be the precursors of death in some other cases. Under these circumstances, with the concurrence of my colleagues, I performed the operation which I am about to describe. I introduced the forefinger of the left hand into the rectum. I then passed a probe-pointed curved bistoury into the wound, and quite to its farthest extremity on the left side of the neck of the bladder. The probe point having been felt through the tunics of the rectum, I pushed it carefully through them, and, drawing it downwards, divided the lower part of the rectum, sphincter and all. Thus the wound and the rectum were laid into each other. Little or no hæmorrhage followed. The relief

was immediate. In five minutes after the operation the intermissions of the pulse had diminished from one in fifteen, to one in fifty beats. In an hour it did not intermit at all. During the two following days the patient appeared quite well; the pulse was regular between 70 and 80 in a minute. On the next day there was a slight recurrence of the intermissions of the pulse, but it subsided on the exhibition of some brandy and ammonia. After this there was a progressive amendment; the pulse, however, continuing to beat between 80 and 90 in a minute for the two or three following weeks. After about a month, the wound in the rectum began to contract, and the urine to flow by the natural passage; and in another fortnight the patient went into the country, nearly the whole of the urine at this time flowing by the urethra.

I have already informed you that my experience does not justify me in stating, that, after the operation of lithotomy, there is no danger of death from hæmorrhage; and I have mentioned to you that I had myself the misfortune of losing one patient from this cause. This case, which occurred many years ago, was that of an old man, with an enlarged prostate and an unusually deep perineum. The blood seemed to proceed from the neighbourhood of the neck of the bladder; and what was remarkable, it was venous. I was foiled in all my attempts to restrain the hæmorrhage, and the patient survived the operation only a few hours.

I have known some other cases of death from hæmorrhage, occurring in the practice of other surgeons. It must be acknowledged, however, that such cases are but a very few out of a great number, and that the chance of a patient bleeding to death, where the incisions are made low down, and are not more extensive than is really necessary, and where proper attention is paid, and proper precautions are used, after the operation, is so small, that it need not enter into your calculations. I speak of attention and precautions after the operation; for, without these, I suspect a dangerous hæmorrhage would occur more frequently than it does. I performed the operation on an old gentleman, and extracted a large calculus. But a still larger stone remained in the bladder, which could not be extracted through the incision which I had made, without the application of what I conceived to be a dangerous degree of force. I therefore made another incision in the right side of the prostate, with a straight probe-pointed bistoury, and the stone was then easily extracted. A frightful hæmorrhage followed the last incision; so that I have no doubt that the patient would have died from loss of blood, if an assistant had not pressed the internal pudic artery against the bone with his finger for several hours. Some years before this, soon after I had been elected assistant surgeon to the hospital, Sir Everard, then Mr. Home, operated on an elderly man for stone in the bladder. There was a considerable bleeding at

the time of the operation, but it was not much regarded, and the patient was taken to his bed. About half an hour afterwards, the nurse came to me in great alarm, saying that the *stone-patient* was bleeding to death. When I reached his bed-side I found him pale and yawning, the bed drenched with blood, and a complete puddle of blood on the floor under the bed also. I drew him to the end of the bed, and having placed him in the position in which he had been placed for the operation, found the blood still flowing from the wound. On pressing the internal pudic artery of the left side against the bone, by means of the finger, the hæmorrhage was immediately suspended. Fortunately the patient was a thin person, and, without any great difficulty, with the assistance of a small flexible silver needle, I was enabled to pass a ligature round the trunk of the pudic artery. This fully answered the intended purpose. The patient was saved; but if assistance had been delayed, even a few minutes longer, it must have been unavailing.

I have sometimes heard it observed by by-standers, when a patient has lost a good deal of blood at the time of the operation, "that he has lost no more than it will do him good to lose." I have, however, great doubts whether, even in the case of the strongest man, the losing much blood adds to his chance of recovery; and it is evident, that in the case of a person of originally weak constitution, or of one whose bodily powers

are exhausted by his previous sufferings, the loss of a considerable quantity of blood in the operation is likely to make all the difference between its success and failure.

I may take this opportunity of observing, that secondary hæmorrhage sometimes occurs after lithotomy: I suppose in consequence of the separation of a slough. A little boy, on whom I had operated, lost, what was for him, a large quantity of blood; and (if I recollect right, for I have no notes of the case) some time in the second week after the operation. He was excessively lowered by the hæmorrhage, but ultimately recovered. Mr. Earle related to me a case of hæmorrhage seven or eight days after lithotomy, which occurred to him in St. Bartholomew's Hospital. The bleeding was sufficient to be alarming; but he succeeded in stopping it, by introducing through the wound into the bladder a tent, composed of a quantity of lint, wrapped round an elastic gum catheter.

Patients may, and continually do, recover, in whom circumstances have occurred causing the operation to be protracted for a considerable time. Nevertheless, other things being the same, there can be no doubt that, as the operation occupies a longer time, so it is more dangerous. When I was a student at the hospital, a large fat man, with a very large stone, submitted to the operation. He was in good health otherwise; but the stone broke into a number of

fragments. There was a deep perineum; and these circumstances combined made the operation very difficult, although performed by a very skilful surgeon. The patient was more than an hour on the table. He died very soon after being taken back to bed, manifestly from exhaustion.

The causes of failure which I have already enumerated are connected with circumstances which occur during the operation, and which may be supposed to be, to a certain extent at least, under the control of the surgeon. But there are other cases, in which death takes place as a consequence of the operation, although nothing has happened in the performance of it, which the most anxious surgeon could wish to have been otherwise. Some individuals are good subjects for the operation, and recover, perhaps without a bad symptom, although the operation may have been very indifferently performed. Others may be truly said to be bad subjects, and die, even though the operation be performed in the most perfect manner. What is it that constitutes this essential difference between these two classes of cases? It is, according to my experience, the presence or absence of organic disease. A patient with organic disease of other organs has a smaller chance of recovery than he would have had if such disease did not exist; but it is organic disease of the urinary organs, the kidneys, or bladder, or parts

connected with them, that is to be especially apprehended as increasing, ten-fold, the hazard of the operation. Of persons in whom the stone is not of a large size, on whom the operation is performed, I will not say very well, but not very unskilfully, and who are free from all organic disease, there are very few who do not recover; while, of those in whom organic disease exists, there are few who do not die. It becomes, then, the duty of the surgeon to consider what are the organic diseases most likely to occur in combination with stone in the bladder, and how they are to be recognised in the living person, in order that he may be enabled to judge, before he proposes an operation, or before he accedes to the patient's wishes that he should undertake it, how far it is, or is not, probable that it may prove successful.

The common enlargement of the prostate gland, such as occurs in old men, and existing in a moderate degree, does not, as far as my observation extends, add to the danger of the operation. In fact, it succeeds, on the whole, better in old men between seventy and eighty years of age, than in those who are ten or twenty years younger, although the former are likely to have the prostate of a larger size than the latter. An excessive enlargement of the prostate, however, is to be regarded as an unfavourable circumstance, inasmuch as, by adding to the distance between the bladder and skin of the perineum, and placing the bladder beyond

the reach of the finger, it makes the operation more difficult. I may take this opportunity of mentioning that I have performed the operation on two individuals, who for some years previous, in consequence of the enlargement of the prostate, had been unable to void a drop of urine without the aid of the catheter. The first of these remained in this respect, after the operation, exactly as he was before, and required the use of the catheter, even while the wound in the perineum was still open. The other has not only regained the power of making water, but can actually empty his bladder by his own efforts. This last case, however, occurred lately; and it remains to be seen how far the relief is permanent.

It sometimes happens that the prostate gland, where it projects into the bladder, is ulcerated. I have formerly explained to you, what are the symptoms produced by this combination of ulcerated prostate and stone in the bladder. It remains for me to tell you the result of the operation of lithotomy, performed under these circumstances. When I was a very young member of our profession I was present at two such operations. In the first of these cases the operation was recommended by two of the most eminent surgeons who were then in practice. It was performed, to all appearance, dexterously, occupying scarcely three minutes. The patient died within ten minutes after he had been replaced in bed. In the second case the bladder

contained eighteen or twenty stones (I believe more), which, of course, made the operation more tedious. As soon as it was over, the patient fell into a state of stupor, from which he never recovered. He died in about twelve hours.

Chronic inflammation of the mucous membrane of the bladder is not very uncommon in cases of stone in the bladder; and although by no means a favourable circumstance, is not to be regarded as so unfavourable as to justify you in declining to perform the operation on this account; indeed, if you were to do so, all your patients with fusible calculus would be left to die, for it is on this chronic inflammation that the deposition of the mixed phosphates, which constitute the fusible calculus, depends. But this chronic inflammation is sometimes aggravated, so much so, indeed, as to assume the characters of acute inflammation. The inclination to void the urine is then incessant, night and day, preventing sleep, and attended with horible suffering. The urine deposits a large quantity of offensive, ropy, adhesive mucus, of a red colour, in consequence of blood being blended with it. Such cases as these are unfavourable for the operation. It may hasten the patient's death; or more frequently the patient will die in spite of it, and the operation will have the credit of having occasioned his dissolution. I have twice performed the operation under the circumstances which I just mentioned. In neither case did I recommend it, but the contrary. The patients,

however, required it of me, being driven to it by excessive suffering; and I performed it in compliance with their wishes, as a matter of duty. I will tell you the result. The first patient experienced great and immediate relief. The wound granulated, and was completely healed in less than three weeks; but, nevertheless, it was evident that there was something wrong. The patient was languid and listless, incapable of exertion, and not even desiring to make it. At the end of a fortnight, or rather more, he began to complain of pains, like those of rheumatism, but more severe, in the shoulder, arm, and other parts of the body. He had rigors, gradually became weaker and weaker, and died about a month after the operation. On examining the body, the mucous membrane of the bladder was found still bearing the marks of much inflammation. The inflammation had extended to the cellular membrane external to the bladder, which was, in some parts, infiltrated with lymph and serum; and a small quantity of pus had been effused in the neighbourhood of one ureter. One of the kidneys was almost completely wasted; but this was manifestly the result of disease at some former period, and, in all probability, had no immediate connection with the patient's death. In the second case there was also great immediate relief: so that for some days there were no bad symptoms of any description, and I told the patient's friends that all danger from the operation was at an end. But at the end of

about a week from the time of the stone having been extracted, he began to sink. It was difficult to say what he ailed, but it was evident that his physical powers were on the decline; and in the course of four or five days more he died. On examining the body, the mucous membrane of the bladder was found to be of a dark colour, in consequence of its vessels being very much loaded with blood. The same appearance was traced along the membrane of the ureters to the pelvis and infundibula of the kidneys, and these last-mentioned parts were distended with what appeared to be an admixture of pus and adhesive mucus.

From what I have seen in some other cases, I am led to believe that these patients would have died nearly as soon, perhaps quite as soon, if the operation had not been performed. They died, as I have already said, in spite of the operation, and not in consequence of it. But these are distinctions which the public, and even some members of our own profession, do not comprehend. It is desirable, on all accounts, to avoid, if possible, performing an operation under these peculiar circumstances. Such cases only tend to bring it into disrepute, and prevent some other persons submitting to it, in whom there might be scarcely a doubt as to its success.

In the last-mentioned case there was disease in the kidneys, the consequence of inflammation extending upwards along the ureters, from the mucous membrane of the bladder. But disease

originating in the kidney, where the bladder itself is in a healthy state, equally adds to the danger of the operation. The patient is unable to bear the shock which the operation gives to his nervous system, and dies either immediately after the operation, or before the wound is healed. It is true that he labours under a mortal disease; and that he would have died sooner or later if the operation had not been performed; but the operation hastens his death, and is therefore to be avoided.

A boy, sixteen years of age, a midshipman in the navy, had for many years laboured under severe pain in the loins, and latterly had suffered from the usual symptoms of stone in the bladder. The poor fellow, however, went on doing his duty on board ship, until he could do it no longer. He was then placed under my care. His sufferings from the stone in the bladder were excessive; and, in addition to these, he had severe pains in the loins, and occasional rigors. The urine, when exposed to heat, and on the addition of nitric acid, exhibited a large proportion of albumen; and Dr. Prout, who was consulted with me, detected some other circumstances connected with its chemical composition, which he had never before noticed, except in combination with organic disease of the kidney. Besides all this, the patient was depressed and languid, and losing flesh. Under these circumstances, Dr. Prout and myself strongly advised that he should not submit to the operation. Some time after-

wards, however, his sufferings from the stone in the bladder became so severe, that the patient declared he would rather die than submit to them any longer; and, at the earnest request of himself and his friends, I removed the stone from the bladder. It was a mulberry stone, of a middle size; and every thing in, and immediately after the operation, was as favourable as possible. For the first week, the patient seemed to go on well: he was free from pain, and happy, and his health improved. The only remarkable circumstance was an enormous secretion of urine, amounting to diabetes. At the end of a few days this ceased, but it was followed by a profuse diarrhœa. There was a succession of watery evacuations from the bowels, which nothing could check. He became weaker and weaker, had a shivering, and died before the usual re-action took place, about a fortnight after the operation. On examining the body, an enormous abscess was found in one kidney, and, connected with the abscess, five or six mulberry calculi, of various sizes.

The following remarkable case occurred in this hospital in the year 1808. Sir Everard, then Mr. Home, performed the operation for stone in the bladder on a boy seventeen years of age. The patient was in a state of depression previous to the operation; but with such knowledge as existed at that time on these subjects, it was not supposed that there were any sufficient reasons why he should not undergo it. In the course

of the following night, however, he died. On dissection, the bladder was found inflamed, and the mucous membrane ulcerated. The ureters, pelves, and infundibula of the kidneys were dilated. The kidneys themselves were of a pale colour, and in the upper part of each of them was a large abscess. The abscess connected with the right kidney had burst into the abdomen (probably at the time of the operation), and not less than half a pint of pus had become effused into it immediately below the liver.

Before determining on lithotomy, you have no more important duty to perform than that of enquiring into the state of the kidneys. I have already explained to you what symptoms mark the existence of disease in the kidneys, connected with calculi. One thing to be especially attended to, with a view to a correct diagnosis, is the state of the urine. The urine may be alkaline, and thus in an unnatural state, and yet the kidneys may be free from organic disease, and the patient a proper subject for the operation. It is purulent urine, and albuminous urine, by which your apprehensions as to the result of an operation will be chiefly excited. Albuminous urine, however, where all other circumstances are quite favourable, is not a sufficient reason for your declining the operation. I had a patient under my care, with stone in the bladder, a gentleman sixty years of age, whose urine was highly and constantly albuminous. At first, I hesitated to recommend the operation; but finding that he had not a bad

symptom besides this, my opinion altered. I performed the operation; the patient recovered without the smallest untoward circumstance occurring, and continued well when I last heard of him, nearly three years after the operation.

Success in lithotomy must undoubtedly depend in a great degree on the manual skill of the surgeon, and on the mode in which the operation is performed; but it depends still more on the condition of the patient with respect to his general health, especially on the existence or non-existence of organic disease. Not a little may be attributed to accident, which may at one time throw in your way a succession of cases which are favourable, and at another time a succession of cases which are unfavourable, to the operation; and hence it has often happened, that a surgeon, who has been fortunate in the results of his practice as a lithotomist at one period, has been unfortunate at another. An experienced surgeon has generally an advantage over others, in consequence of his greater skill in diagnosis, by which he is enabled to determine whether the constitution is, or is not, oppressed by any organic disease, especially of the urinary organs, and parts in immediate connection with them. What I have said in former Lectures will, I trust, be found of use to you on these occasions. But let me give you one caution more: never hastily proceed to an operation where a stone has existed in the bladder for a great number of years. It is in such cases especially that you are to expect

the stone to be of great magnitude, and that you are also to apprehend the existence of disease in the bladder or kidneys, or abscess in the cellular membrane of the pelvis. Be assured, that the operation seldom fails where it is resorted to at an early period; but that there is always danger in delay. Many an individual, influenced by his own fears, or in compliance with the absurd advice of his friends, has missed the period at which an operation would have been almost free from danger; has dragged on an anxious and uncomfortable existence, month after month, and even year after year; trying, at one time, medicines prescribed by regular physicians, and, at another time, medicines prescribed by quacks—all to no purpose; and at last has been driven by his sufferings to make up his mind to undergo the operation, when his condition has become so altered, that a prudent surgeon would either altogether decline to undertake it, or would do so with great unwillingness, and solely as an act of duty, or, if you please, of humanity, towards a suffering fellow-creature.

On some other Methods of removing Calculi from the Bladder.

Whatever advances may have been made in the other parts of surgery, it may be confidently asserted, that there has been no real improvement in the lateral operation of lithotomy since it was

practised by Cheselden, more than a century ago. The method which I have described to you is, indeed, that of Cheselden, from whom it has been adopted generally, not only by the operators of this country, but by those of the continent of Europe.

There have not been wanting, however, ingenious persons, who have endeavoured to extract calculi from the bladder in other ways, in the expectation of discovering an operation simpler, or safer, than that of Cheselden. Of late years at attempt has been made in Paris to revive the high operation, in which the incision of the bladder is made at its fundus, where it lies behind the pubes, and immediately below the part at which the peritonæum is reflected over it. The high operation was, indeed, recommended by Cheselden himself, in the early part of his career; but he soon abandoned it for the lateral operation, from which last method he never deviated afterwards. The late advocates for the high operation, however, suppose that they have made in it an essential improvement, inasmuch as they adopt means for keeping the bladder empty of urine afterwards, so as to allow the wound in the fundus of the bladder to heal, without the danger of the urine becoming effused into the surrounding cellular membrane. For this purpose some make an incision into the urethra from the perineum, from which they introduce an elastic gum canula into the bladder: while others employ the simpler expedient of a

gum catheter, introduced by the urethra in the usual manner. I have been present on three or four occasions, when the high operation was performed; but nothing that I have witnessed would lead me to recommend it to you; nor, indeed, does it appear to me that you would be justified in the performance of it, except in the case of a thin person, with a stone of so large a size, that the extraction of it by the usual method would be either impracticable, or attended with the greatest risk to the patient's life. But even for cases such as these there is, I conceive, a better method of proceeding, in the recto-vesical operation; in which the incision of the perineum is made to extend through the tunics of the rectum and the *sphincter ani* muscle. Here the parts which afford the chief resistance to the extraction of a large stone are divided; and, although the incision of the neck of the bladder extends beyond the boundaries of the prostate, the ill consequences arising from the escape of urine into the cellular membrane are likely to be in great measure obviated, in consequence of the free opening which has been made into the rectum. If you refer to a case which I have already related, in which, some days after the removal of a calculus by the usual method, I was induced to lay the wound of the perineum, as far as the neck of the bladder, completely into the rectum, you will find in it much in favour of the recto-vesical operation in those cases in which the great bulk of the stone makes an extensive

incision of the prostate and bladder necessary. Further than this I have little to offer, from my own experience, on this subject. In the only instance in which I performed the recto-vesical operation, the patient, who had suffered from a stone in the bladder for more than twenty years, died in about three weeks, with abscesses in the kidneys, and a large abscess on one side of the pelvis, having no communication with the wound, and which I believe to have existed long before the patient came under my care. The stone in this case had been supposed to be of an unusual magnitude. It proved to be much smaller than was expected; but I felt convinced at the time, that if it had been many times larger than it was, it would, nevertheless, have been extracted with the greatest facility.

I ought not to pass over in silence the new lithontriptic method of operating; but I have little knowledge on the subject, except what I have obtained from books, and from seeing it performed by Baron Heurteloup. Indeed, with my various other engagements, I do not expect to be able to acquire the tact necessary for the proper performance of it. I cannot doubt, however, that in the hands of so skilful and ingenious an operator as Baron Heurteloup it is likely to prove useful on a number of occasions. It possesses these advantages over lithotomy: it is less formidable to the patient; it requires little or no confinement; and persons will be induced

to submit to it, at an early period, who would not have mustered courage to submit to lithotomy until after a lapse of time, when their sufferings had become excessive, and when probably some circumstances had arisen to make the operation dangerous. To this may be added, that there is no danger of hæmorrhage, nor of those ill consequences which arise from an incision or laceration extending into the loose cellular structure which surrounds the neck of the bladder.

At the same time it must be admitted that this method has its disadvantages also. It is not well adapted except to stones of moderate dimensions; and, when applied to those of a large size, the destruction of them is either altogether impracticable, or difficult and tedious. The patient does not obtain a cure at once; and in many instances the process by which the stone is crushed requires to be repeated several times. As the smallest fragment which remains behind will form the nucleus of a new stone, a recurrence of the disease is more likely to take place after the lithontriptic operation, than after that of lithotomy, especially in those cases in which, in consequence of an enlargement of the prostate gland, the patient is unable completely to empty his bladder. It is further to be observed, that those complications of disease in the kidneys, or bladder, or ulcerated prostate, which render the old operation dangerous, render the new operation dangerous also; so that the invention of

the latter does not relieve us of those cases in which experience has taught us to shrink from the performance of the former. As to the quantity of actual suffering which the patient has to undergo under one of these methods, as compared to that which belongs to the other, it is not possible to arrive at any very satisfactory conclusion. The fact is, that the amount of actual pain is generally over estimated, and that those who have gone through either of these operations usually say afterwards that the pain was less than they had expected. This observation applies at least to cases in which the bladder is healthy, and the operation proceeds favourably. If the bladder be inflamed, or any thing occurs to render the operation difficult and tedious, the patient undoubtedly suffers for the time severely, whether the stone be crushed, or extracted by incision.

Calculi of the Prostate Gland.

Calculi occasionally form in the ducts of the prostate gland. In the museum of this hospital there is a preparation of an enlarged prostate, in every part of which are found minute calculi, none of them bigger than a pin's head, and too numerous to be counted. In general, however, they are fewer in number, and larger in size; I have seen them as large as a pea, or even as a horse-bean. They are composed of the phos-

phate of lime, of a light brown colour, and not unfrequently are smooth and somewhat glossy on the surface. I believe that they frequently exist for a considerable time, without the patient being aware that he labours under any kind of disease. In other cases they cause a sense of irritation, referred to the perineum and neck of the bladder, and sometimes a difficulty of making water, so that patients have applied to me, supposing themselves to labour under stricture of the urethra, whose real complaint was the formation of prostatic calculi.

We know of no medicine that is capable of preventing the formation of this kind of calculus; and in ordinary cases there seems to be nothing for us to do, beyond the occasional introduction of a full-sized bougie, to keep the urethra dilated, and thus favour the escape of the calculi as fast as they become disentangled from the ducts of the prostate, in which they have been generated.

There are some cases in which a number of these calculi are collected in a cyst in the prostate gland, plainly perceptible with the metallic sound introduced into the urethra, and just before it enters the bladder; to be felt also with the finger in the rectum, sliding on each other under the pressure of the finger. In a case of this kind you may introduce a staff into the urethra; and with this for your guide, make an incision in the perineum extending to the prostate, but not into the bladder, and thus extract the calculi. I have formerly mentioned to you

a case of this kind, in which I succeeded in removing a large number of prostatic calculi by means of Weiss's urethra forceps. There is always danger of some of these calculi finding their way into the bladder, and thus laying the foundation of calculi of the bladder. This happened in the case to which I have just referred; so that after I had completely emptied the cyst of the prostate, I had to remove a considerable number of calculi, of a still larger size, but of the same chemical composition, from the cavity of the bladder.

Treatment of Calculus of the Female Bladder.

In women calculi of a small size are expelled, as they are in the male sex, without ulceration, or other injury to the urethra, and without the patient suffering any inconvenience afterwards.

Calculi of a very considerable size occasionally escape from the female bladder; but the natural cure in these cases is effected by a less simple process. A woman was admitted into our hosptal, under the care of the physicians. On enquiring into her case the apothecary of the hospital found a large calculus lying in the vagina, and he extracted it with his fingers. The urethra and vagina had ulcerated, and the calculus had passed through the ulcerated opening. The patient was thus relieved of the disease under which she had for a long time laboured; but it left another and

very distressing disease behind it, namely, an incontinence of urine. Many cases similar to this have been recorded by writers; and you will find a paper on the subject, which is well worthy of your attention, by Dr. Yelloly, in one of the volumes of the Medico-Chirurgical Transactions. There is reason to believe that incontinence of urine always follows the natural cure, where the calculus has made its way out of the bladder by ulceration.

The peculiar structure of the female urethra renders it much more capable of dilatation than the urethra of the other sex; and stones of considerable size may be removed in this manner, without the aid of any cutting instrument. If you look over the early volumes of the Philosophical Transactions, you will find that this is no new invention; but the operation had fallen into disuse, and, indeed, I may say that it had been forgotten, when it was revived by Mr. Thomas. Mr. Thomas was called to a lady, who, I know not for what purpose, had deposited an ivory tooth-pick, three inches long, in her bladder. He introduced a piece of sponge tent into the urethra; as the sponge swelled, the urethra became dilated, and the tooth-pick was then easily extracted. Since then the same operation has been performed by Sir Astley Cooper, and various other surgeons. I have myself employed this method in two instances. In the first, I accomplished the dilatation by means of a piece of sponge tent; in the second, I made use of the

dilator which Mr. Weiss has invented for this purpose, and which is undoubtedly to be preferred to the sponge tent, as it enables you to dilate the parts very gradually, and does not interfere with the free escape of the urine. Neither of these patients suffered from incontinence of urine afterwards.

When you attempt the dilatation of the female urethra, I would advise you to proceed gradually. The process, however, may in most instances be completed, and the stone extracted, in less than twenty-four hours. If you use the sponge tent, it should be of that kind which is made by compressing a piece of wet sponge between two pieces of board in a vice, or under a very heavy weight, and not that prepared with wax; and the tent should be once or twice removed and renewed, in order that it may be increased in size, and also that the patient may not suffer from retention of urine.

The operation which I have just described does not, however, seem to be applicable except to cases of calculi of moderate size. Where the stone is large, an incision of the urethra is necessary for its extraction; and this may be accomplished in the following manner: — Introduce a director or straight staff into the urethra and bladder, and then, by means of a cutting gorget, a common, straight bistoury, or the *bistouri caché*, divide one side of the urethra, dilating that canal to a sufficient size for the introduction of the forceps. It has been most usual to make

the incision of the urethra obliquely downwards and outwards, so as to include a small portion of the vagina. The bladder is completely within reach of the finger, and nothing can be more easy or expeditious than the method which I have just described. But the patient is generally subject to the great inconvenience of an incontinence of urine afterwards. I need not tell you how important it is that such a result should be avoided. The late Mr. Hey of Leeds, in one instance, after the operation, introduced a tent, formed of a roll of linen, into the vagina: I conclude that this kept the cut surfaces in a state of apposition, and caused them to unite by the first intention; at any rate the experiment succeeded, and the patient was able to retain her urine afterwards. I repeated Mr. Hey's experiment in a case in St. George's Hospital, but not with the same success. The patient, however, was a young and restless child: it was difficult to retain the tent in the vagina, and I do not think that, in this instance, the method was fairly tried. I have not, however, repeated the experiment, as I have been informed that it has failed in other hands.

I was led to believe that the whole of the female urethra could be dilated easily, and to a great extent, with the exception of the external orifice, and, under this impression, in the next case, which came under my care, I tried another modification of the operation. Having introduced a straight staff into the urethra, I made a

small incision extending through the peculiar structure which surrounds the orifice of that canal, but no further. The wound did not extend more than one third of an inch in any direction. I was then enabled gradually and with very little force to introduce a pair of forceps, and extract the stone. The patient after the operation was not troubled with actual incontinence of urine. She could retain her urine one or two hours, but not so long as an ordinary person. The stone, however, in this case was not above an average size; and I do not suppose that the same method of operating would be found applicable to a case in which the stone was of large dimensions.

Soon after this I had an opportunity of trying a method which my friend Mr. Hodgson of Birmingham told me that he had seen employed with success by another surgeon, and, if my recollection be accurate, in two or three instances. I introduced a *bistouri caché* into the urethra, having previously fixed the screw in the handle of the instrument, so that the cutting edge could not be made to project more than to a very small extent; perhaps about one sixth of an inch. Then drawing out the bistouri, with the cutting edge turned directly upwards, I endeavoured to divide the membrane of the urethra immediately below the symphysis of the pubes, without allowing the incision to extend into the neighbouring cellular structure. The next step of the operation was to introduce Weiss's dilator, and dilate the urethra, so as to allow of the introduction of the

finger, and afterwards of the forceps, into the bladder. As the urethra now offered no resistance, this dilatation was readily effected in the course of a few minutes, and thus the stone was extracted. The patient, like the preceding one, did not suffer from actual incontinence of urine after the operation. She could not, however, retain her urine for so long a time as before the stone was formed; I believe not longer than one or two hours. Such at least was the state in which she was at the period of her leaving the hospital. The patient in this case was a middle-aged woman. Since then I have performed the same operation on a girl about twelve years of age, with a similar result.

NOTE

ON THE IRRITABLE BLADDER, AND ON THE DISEASES OF THE KIDNEY.

On referring to the remarks which I have made under the head of *Irritable Bladder*, in the Fourth Lecture, I find that I have been guilty of a serious omission, inasmuch as I have not noticed the disordered sensations which are referred to the bladder, in many cases of disease of the kidney.

In speaking of renal calculi, I have mentioned the case of a lady, in whom a too frequent desire to void the urine, attended with a sharp cutting pain in the act of voiding it, was manifestly the consequence of a calculus impacted in the kidney: and many other cases have fallen under my observation, since my attention was called to the subject, which have convinced me that it is not uncommon for a patient, who labours under a stone, or abscess, or even inflammation of the kidney, to describe his symptoms as if they belonged to the bladder, which is free from disease, rather than to the organ in which the disease is actually situated.* It is needless to point out how important a knowledge of this fact is to the practical surgeon. Those, who are unacquainted with it, or whose minds are not constantly open to the probability of its occurrence, cannot fail to mistake the nature of a certain number of the cases concerning which they are consulted, to the no small detriment of their patients.

* I do not, however, offer this as a discovery. Several cases in proof of what is here stated have been recorded by Morgagni. — See Letter XLII.

In these cases, in addition to the irritable state of the bladder, and pain referred to the neck of the bladder and urethra after micturition, there is usually a dull pain in the region of the affected kidney, extending downwards and forwards to the groin and pubes, or down the thigh. Occasionally there is pain referred to the corresponding testicle; and I have even known the testicle to be affected with a slight degree of inflammation, swollen, and sometimes indurated. The urine is generally acid, but slightly turbid even when first voided, and exhibiting a considerable quantity of albumen, when exposed to heat, or on the addition of nitric acid. In some cases the urine deposits a purulent sediment. On introducing a catheter, no obstruction is perceptible in the urethra, and the patient is found to be capable of emptying the bladder by his own efforts; and when the bladder is examined by means of a sound, no calculus can be detected in it. In the progress of the disease, it not unfrequently happens that there is evidence of an abscess of the kidney bursting into the ureter, there being a sudden discharge of pus and blood with the urine, preceded by symptoms similar to those which mark the descent of a calculus from the kidney into the bladder; and I have known masses of coagulated lymph, laminated, and of a cylindrical form, as if moulded to the shape of the ureter, to be discharged in the same manner.

It is by attention to the foregoing circumstances that we are enabled to distinguish between the irritable state of the bladder, which depends on disease of the kidney, and that which depends on other causes. Nevertheless, we are sometimes perplexed in our diagnosis, so that it is only after a careful investigation of the history and present symptoms, and after having for some time watched the changes which take place, that we are enabled to arrive at a satisfactory conclusion as to the real nature of the case.

With respect to the treatment to be employed, it may be observed that the symptoms are much alleviated by the exhibition of opiates, whether given by the mouth, or administered in the form of clyster. But in prescribing remedies of this kind, we prescribe for the symptoms only, and not for

the disease. With a view to a more permanent improvement we may recommend, in the first instance, the abstraction of blood from the loins, followed by the application of blisters, or frictions with the Tartar emetic ointment, or (what is a still better method of counter-irritation) an issue made with caustic, and kept open in the usual manner. Small doses of the Cubebs pepper, or the wine of Colchicum, or the acetous extract of Colchicum, are, in some instances, productive of advantage; and when the urine has been highly acid, I have known the patient to improve under a course of Sarsaparilla, combined with the alkalis. These remedies apply chiefly to cases of chronic inflammation of the kidney, where there is a disposition to abscess, or abscess already formed. Where the symptoms depend on a calculus in the kidney, they will, in all probability, not be relieved until the calculus escapes into the bladder, and this must be the result of a natural process, over which our art has little or no dominion.

There is still another omission which cannot be overlooked by those who may refer to these lectures as a complete treatise on the diseases of the urinary organs; an omission which, I am compelled to acknowledge, has not been altogether accidental. In referring to the diseases of other parts, I have had occasion to offer a considerable number of observations relating to the diseases of the kidneys; but I have not felt myself competent to the task of giving a complete analysis and classification of them. When I have referred for assistance to what is already published on the subject, I have found, in the barren histories which books contain, very little which appeared to me to bear the stamp of actual experience, or at all corresponding to what I have myself had the opportunity of witnessing in the course of my practice. I trust that I may be enabled to supply this deficiency at some future period, when my knowledge is more matured, and when I am more satisfied as to the correctness of my own views than I am at present. At the same time I anticipate

much from the labours of Dr. Prout, whose attention has long been directed to the diseases of the kidney; and who, in addition to those powers of philosophical research, which he displays on all occasions, is, from his intimate acquaintance with animal chemistry, especially qualified for the investigation of this part of pathology.

THE END.

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